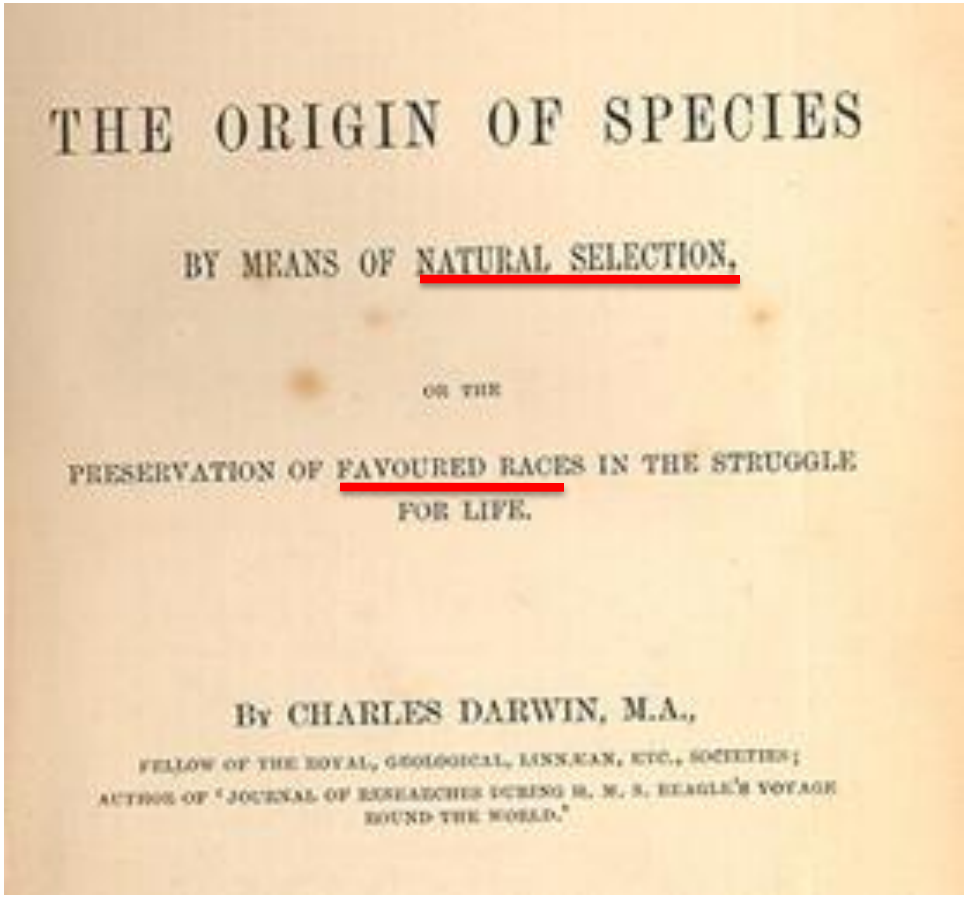
Supplementen

Zin en/of onzin?

Dr. Remko S. Kuipers (MD PharmD PhD)
apotheker n.p., cardioloog, gezondheidscoach, auteur/publicist

Charles Darwin: Survival of the Fittest



THE ORIGIN OF SPECIES

BY MEANS OF NATURAL SELECTION,

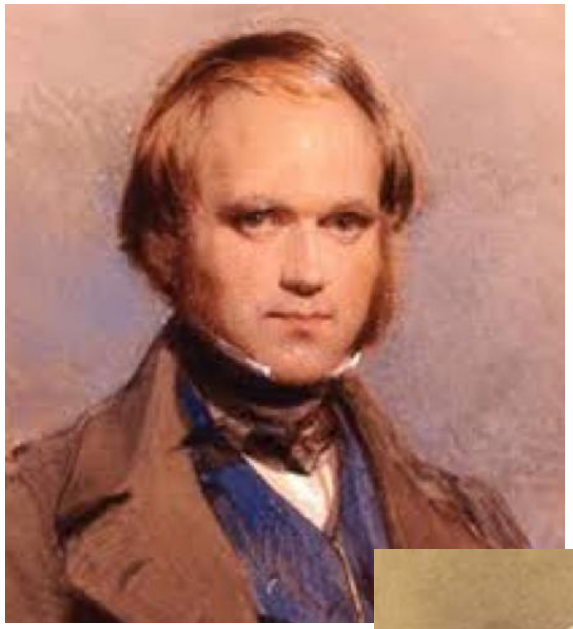
OR THE

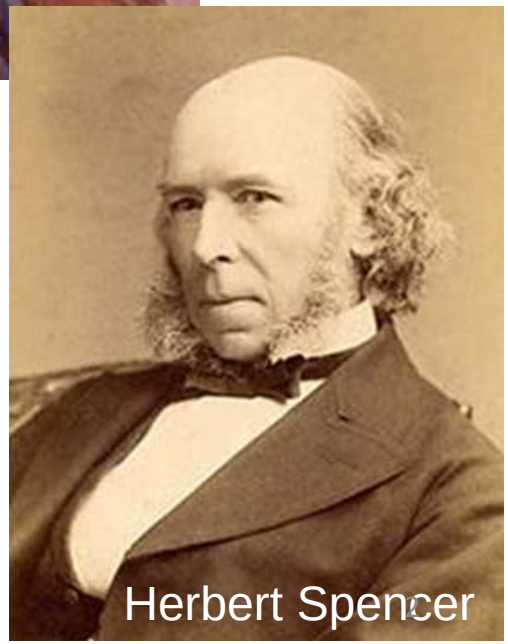
PRESERVATION OF FAVOURED RACES IN THE STRUGGLE FOR LIFE.

By CHARLES DARWIN, M.A.,

FELLOW OF THE ROYAL, GEOLOGICAL, LINNÆAN, ETC., SOCIETIES;

AUTHOR OF 'JOURNAL OF RESEARCHES DURING H. M. S. BEAGLE'S VOYAGE ROUND THE WORLD.'





Herbert Spencer

Law 1. Conditions of existence

Law 2. Natural selection

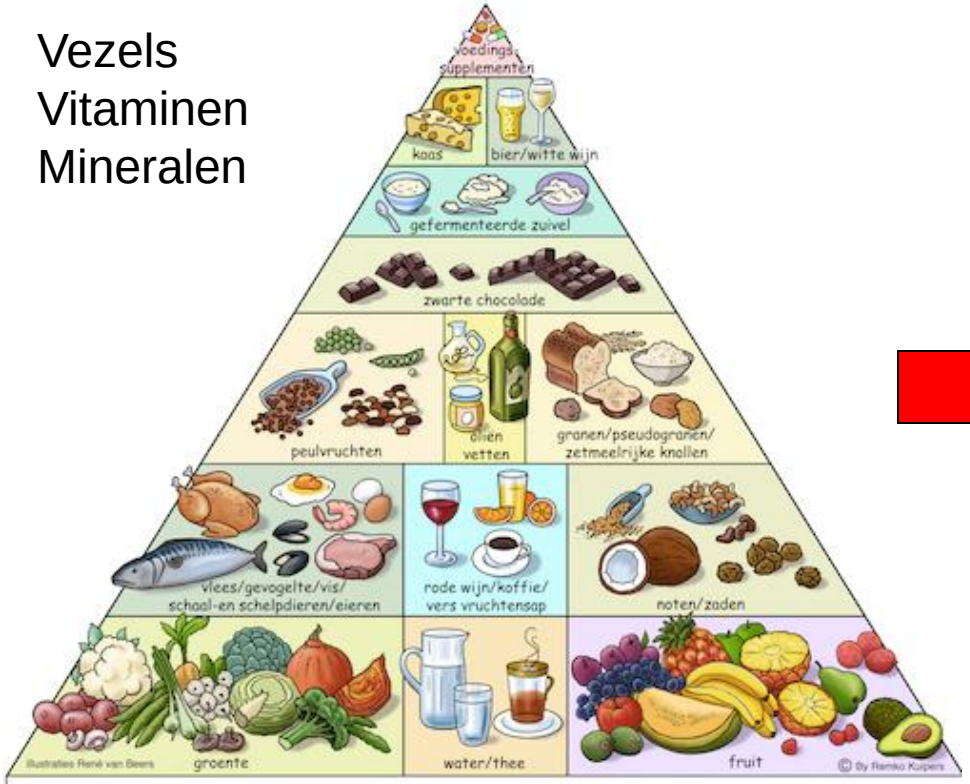
Theodosius Dobshansky

- Nothing in biology makes sense except in the light of evolution

Verlies van variatie en kwaliteit

Micronutriënten = voeden → **Energie = vullen**

Vezels
Vitaminen
Mineralen



OERVOEDSELPIRAMIDE

Koolhydraten
Eiwitten
Vetten

MODERN DIEET

OER → **Modern**

Box 2. Interpretation of evaluation of nutrient intake in a population with dietary reference values

With dietary reference values, it is possible to assess the adequacy of a population's intake to some extent. The way of evaluating the nutrient intake of a population depends on the type of dietary reference value. Figure A shows an overview of the different dietary reference values and their mutual relationship as well as their relationship with the habitual intake and probability of adverse health effects.

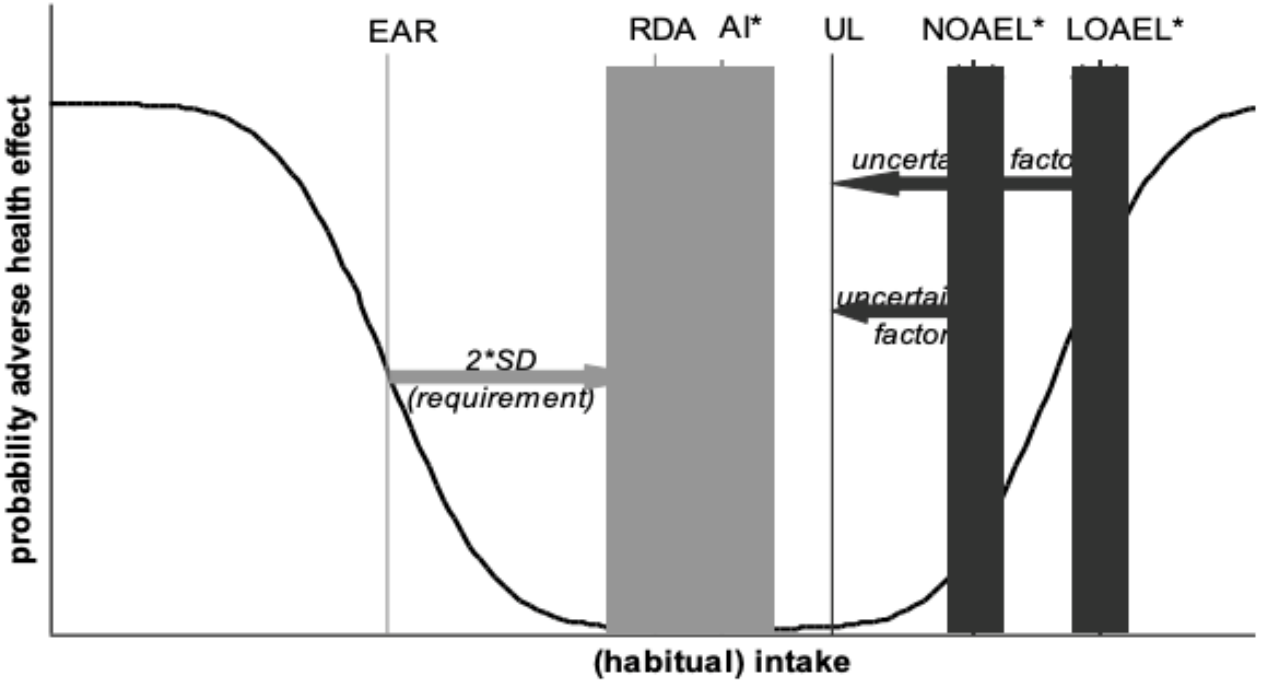
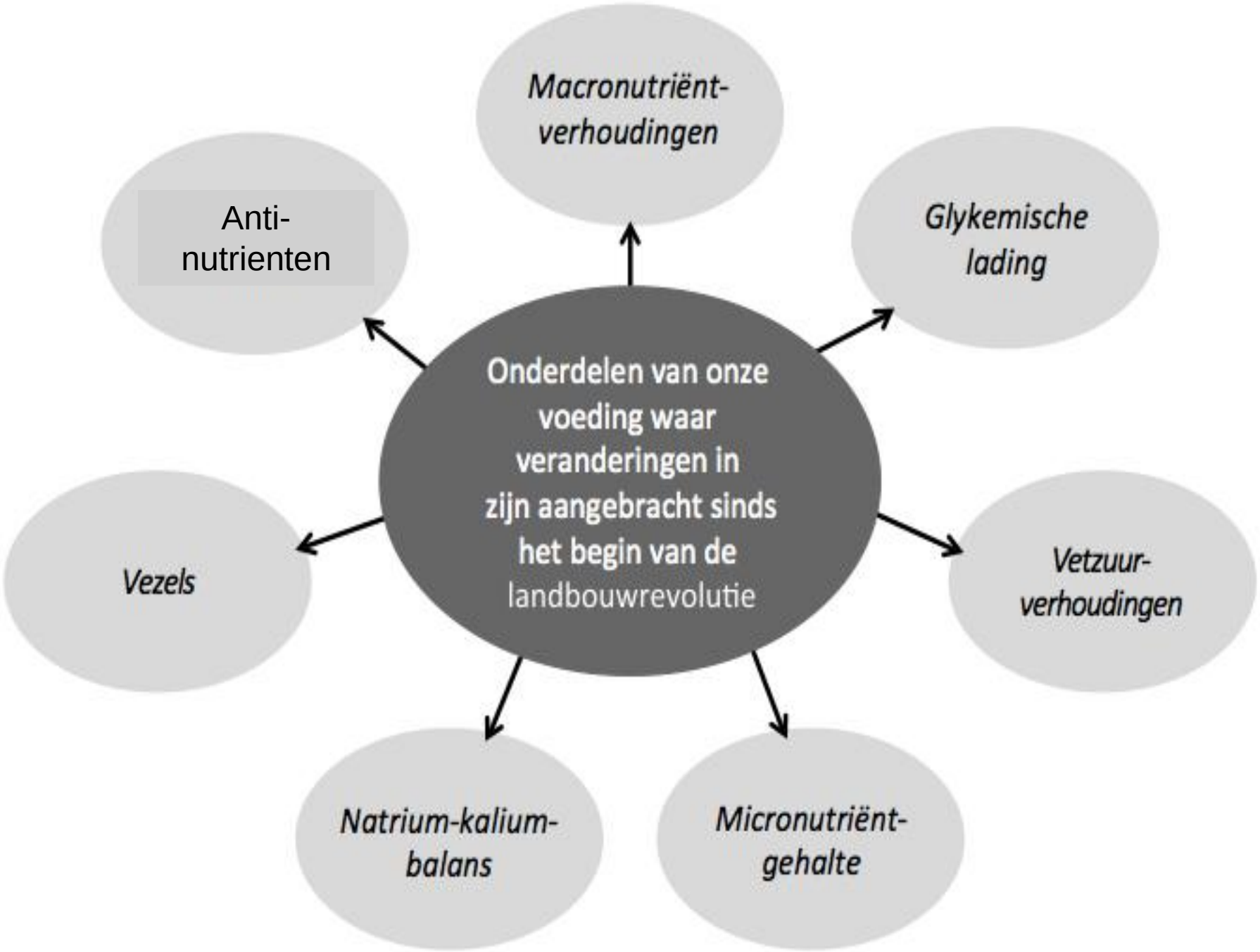
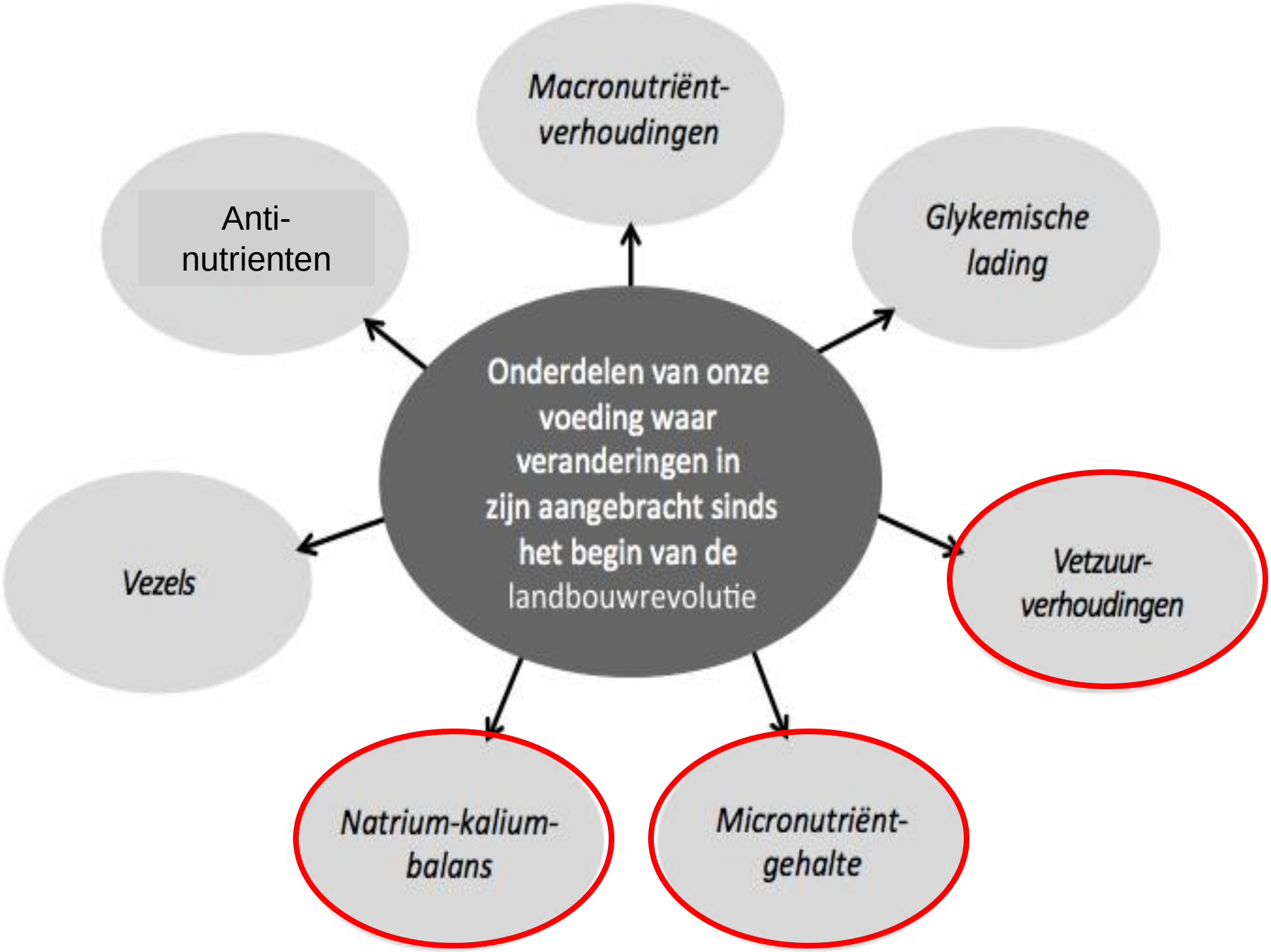


Figure A. Schematic overview of the relationship between (habitual) intake and probability of adverse health effects including the different nutritional reference intakes [1].

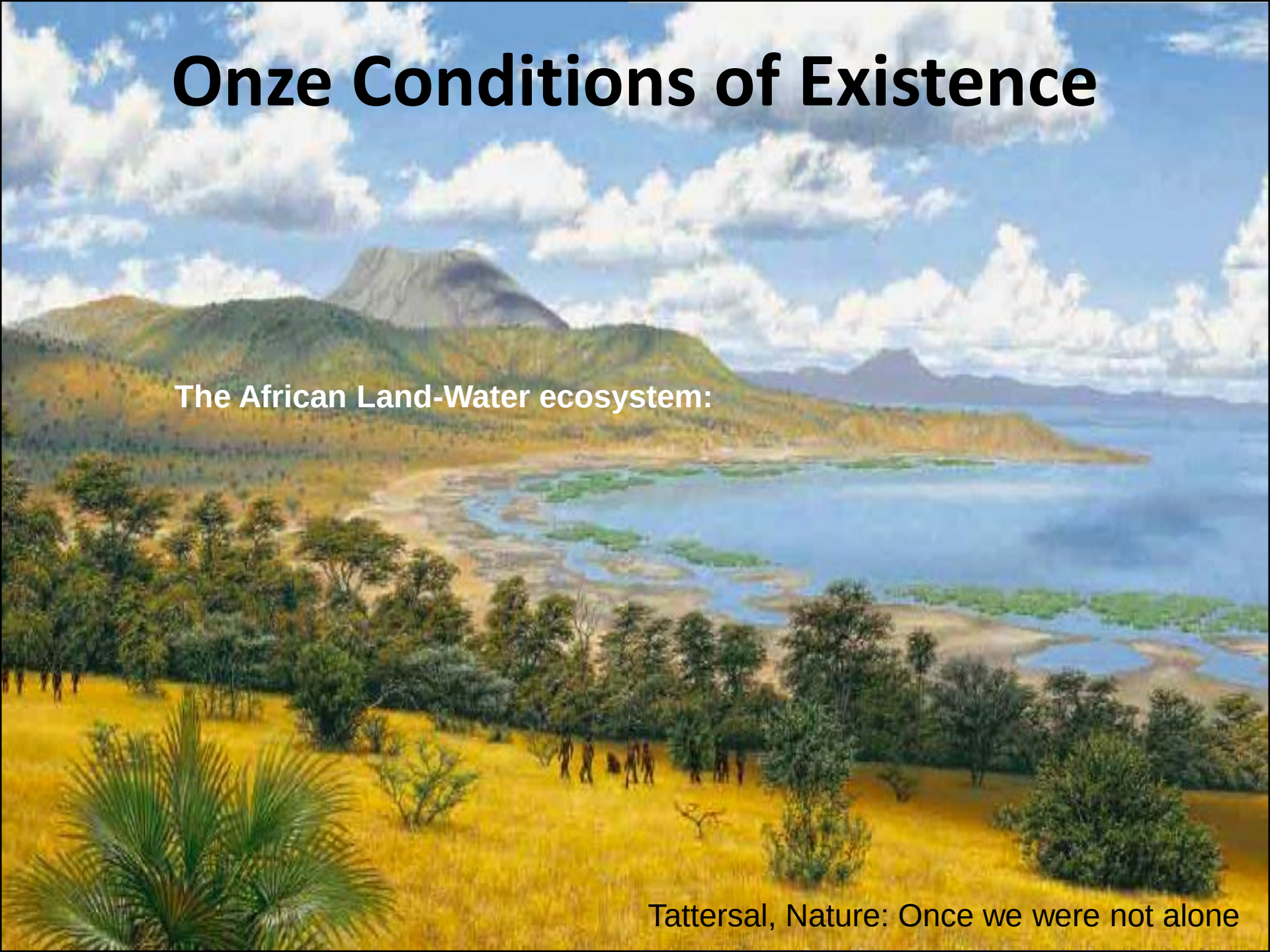
* AI, NOAEL and LOAEL do not have exact relation with requirement (or intake); therefore the lines are dashed and surrounded by a shaded area.

EAR: estimated average requirement; *RDA*: recommended daily allowance; *AI*: adequate intake; *UL*: tolerable upper intake level; *NOAEL*: no observed adverse effect level; *LOAEL*: lowest observed adverse effect level; *SD*: standard deviation.


Macronutriënt-verhoudingen
Anti-nutrienten
Glykemische lading
Onderdelen van onze voeding waar veranderingen in zijn aangebracht sinds het begin van de landbouwrevolutie
Vezels
Vetzuur-verhoudingen
Natrium-kalium-balans
Micronutriënt-gehalte

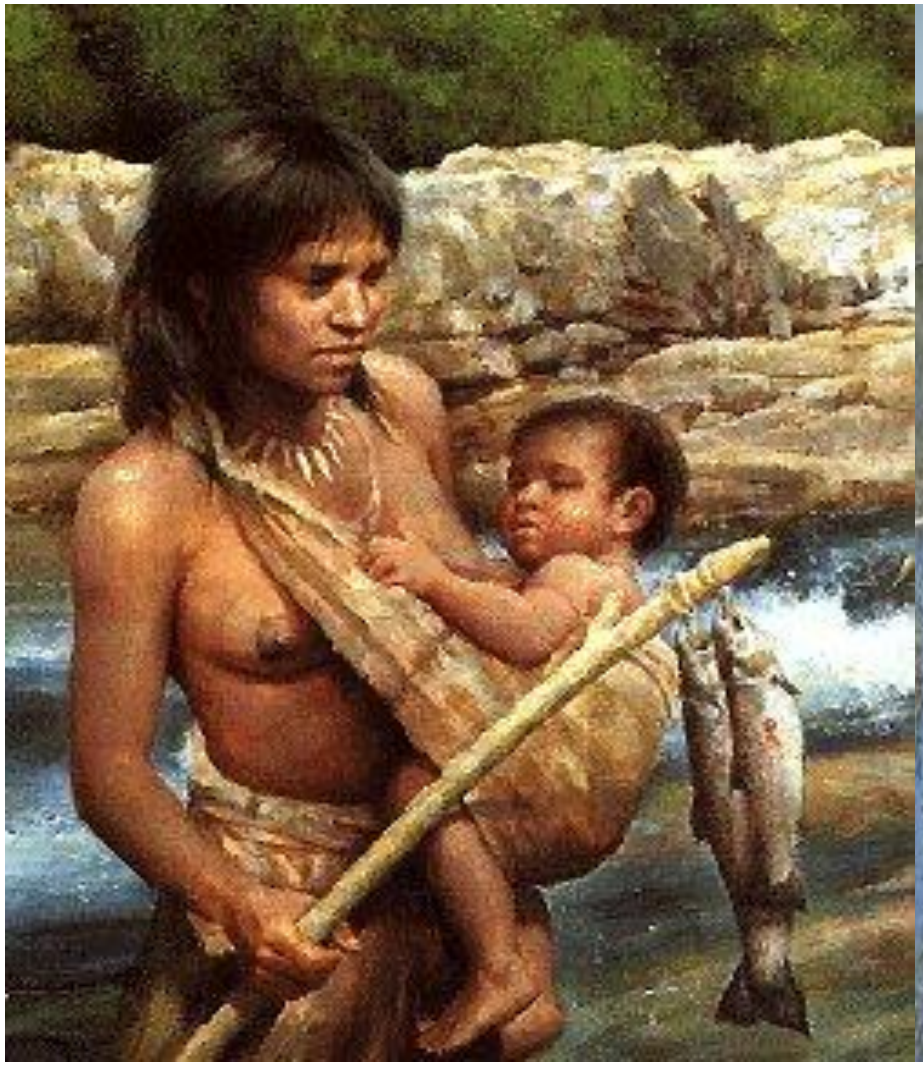

Macronutriënt-verhoudingen
Anti-nutrienten
Glykemische lading
Onderdelen van onze voeding waar veranderingen in zijn aangebracht sinds het begin van de landbouwrevolutie
Vezels
Vetzuur-verhoudingen
Natrium-kalium-balans
Micronutriënt-gehalte

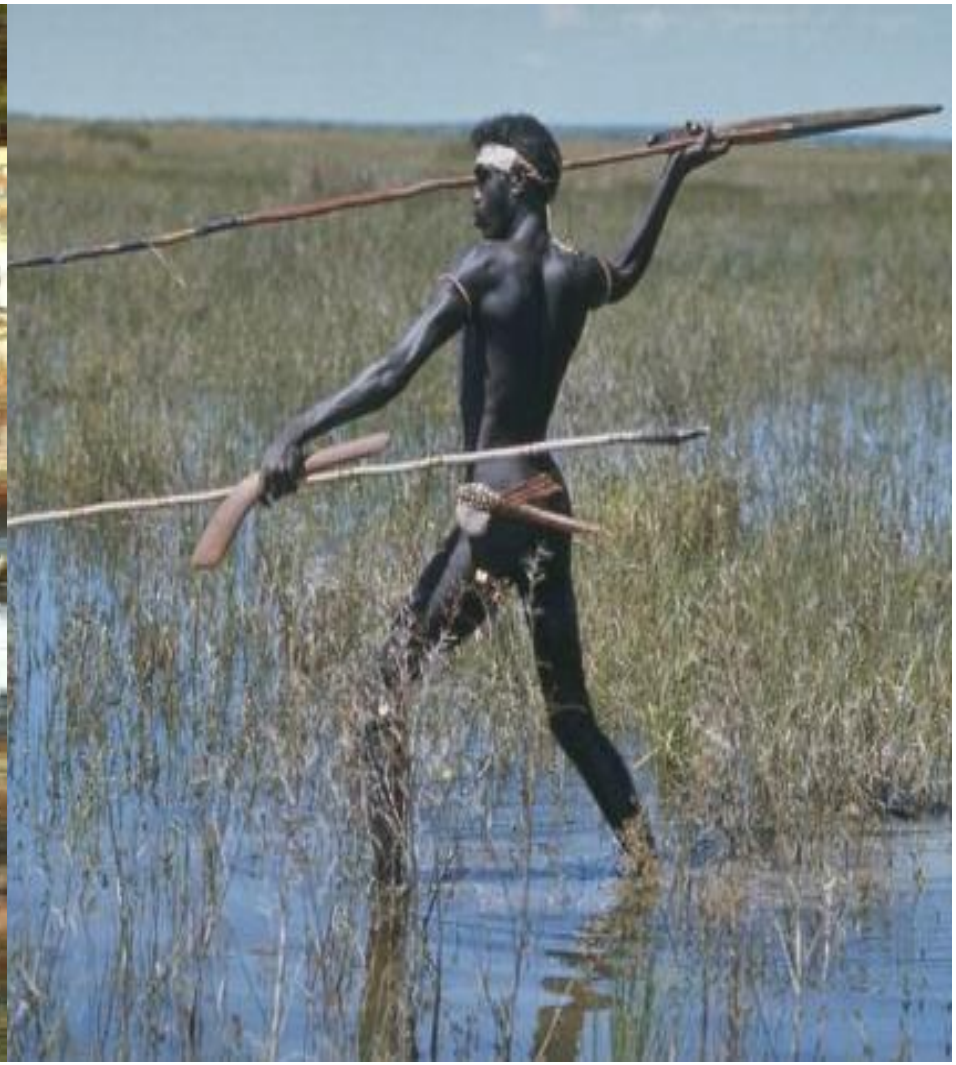
Onze Conditions of Existence



Tattersal, Nature: Once we were not alone

‘Along the water-Gatherers’



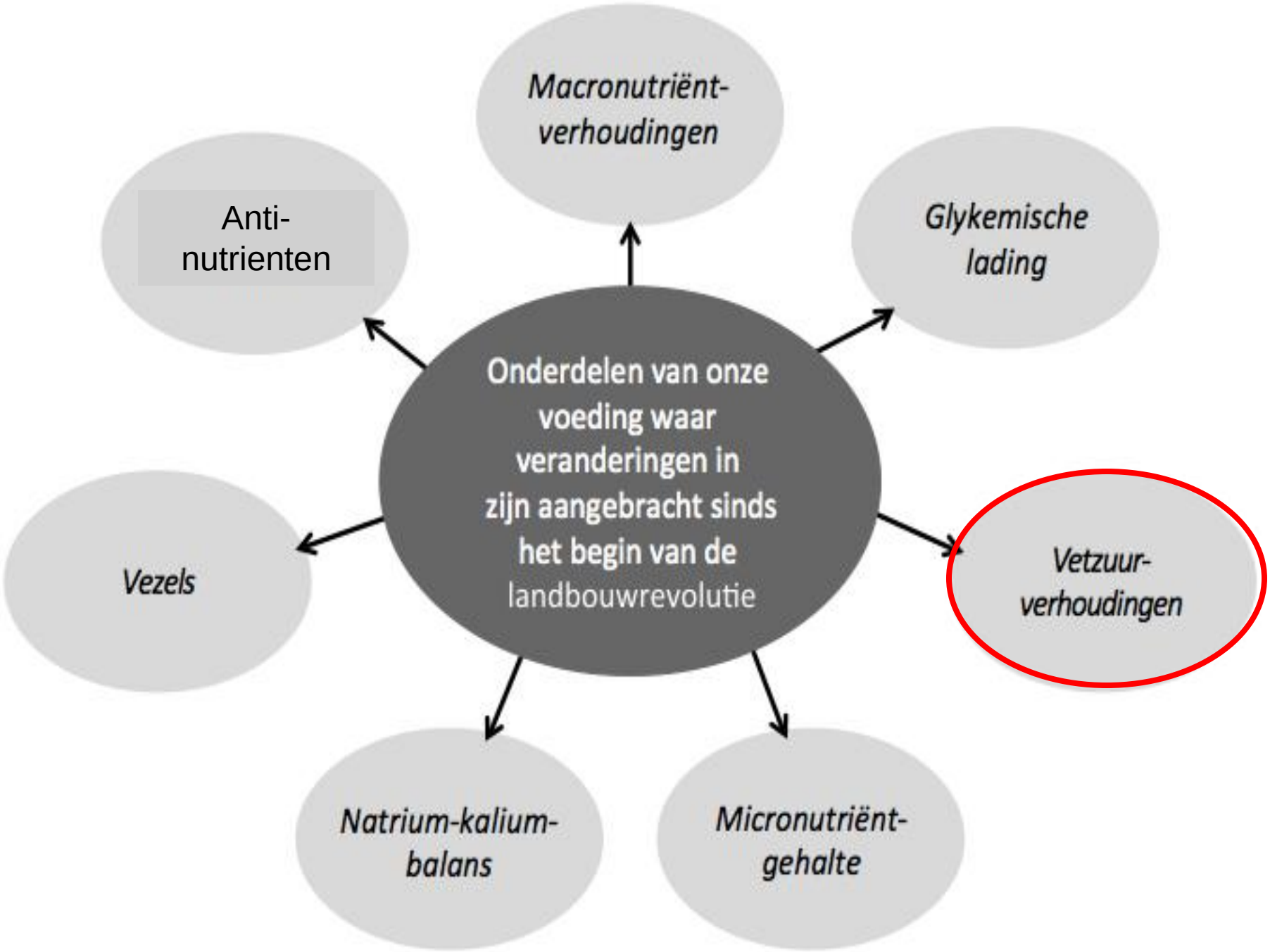


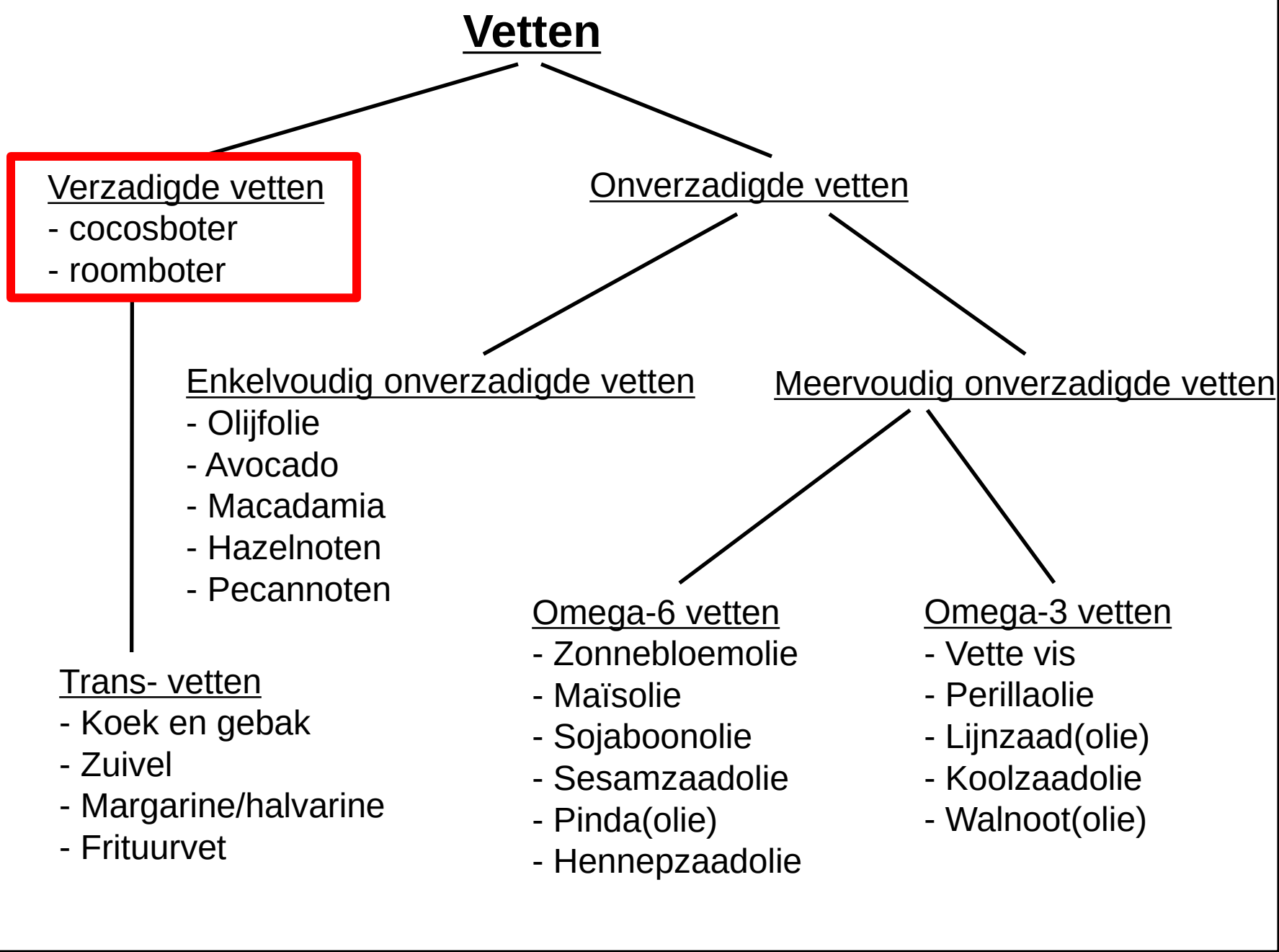






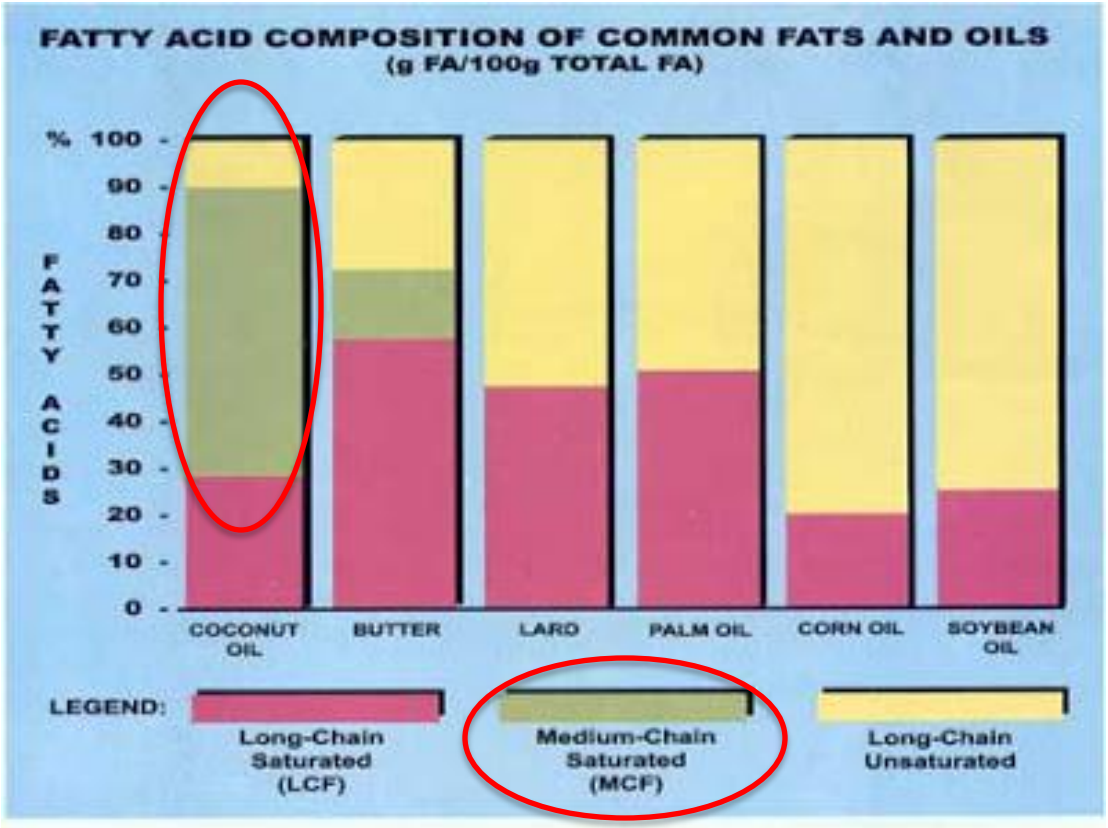



Macronutriënt-verhoudingen
Anti-nutrienten
Glykemische lading
Onderdelen van onze voeding waar veranderingen in zijn aangebracht sinds het begin van de landbouwrevolutie
Vezels
Vetzuur-verhoudingen
Natrium-kalium-balans
Micronutriënt-gehalte


Vetten
Verzadigde vetten
- cocosboter
- roomboter
Onverzadigde vetten
Enkelvoudig onverzadigde vetten
- Olijfolie
- Avocado
- Macadamia
- Hazelnoten
- Pecannoten
Meervoudig onverzadigde vetten
Trans- vetten
- Koek en gebak
- Zuivel
- Margarine/halvarine
- Frituurvet
Omega-6 vetten
- Zonnebloemolie
- Maïsolie
- Sojaboonolie
- Sesamzaadolie
- Pinda(olie)
- Hennepzaadolie
Omega-3 vetten
- Vette vis
- Perillaolie
- Lijnzaad(olie)
- Koolzaadolie
- Walnoot(olie)


IS KOKOSVET GEZOND?
fitbeauty.nl

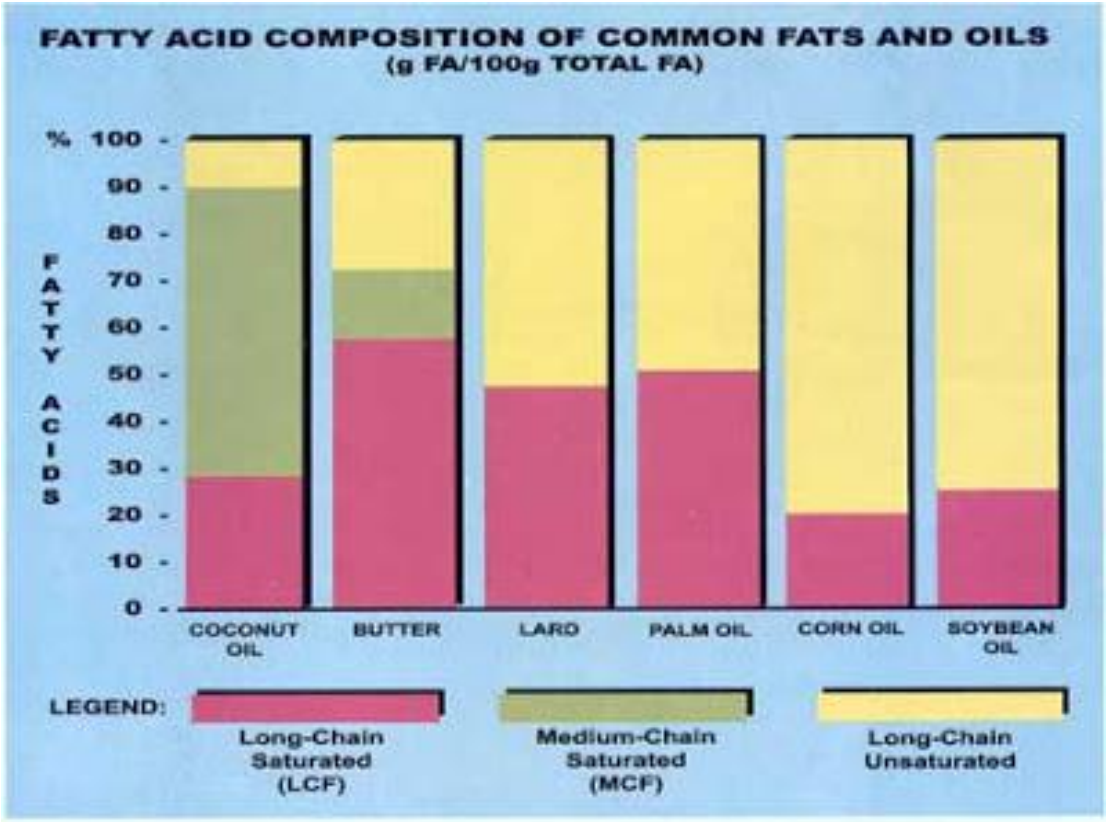
Wat is kokosvet?



Verschil tussen kokosvet en andere soorten vet is hoge concentratie ‘MC-SAFA’

Wat is MC-SAFA

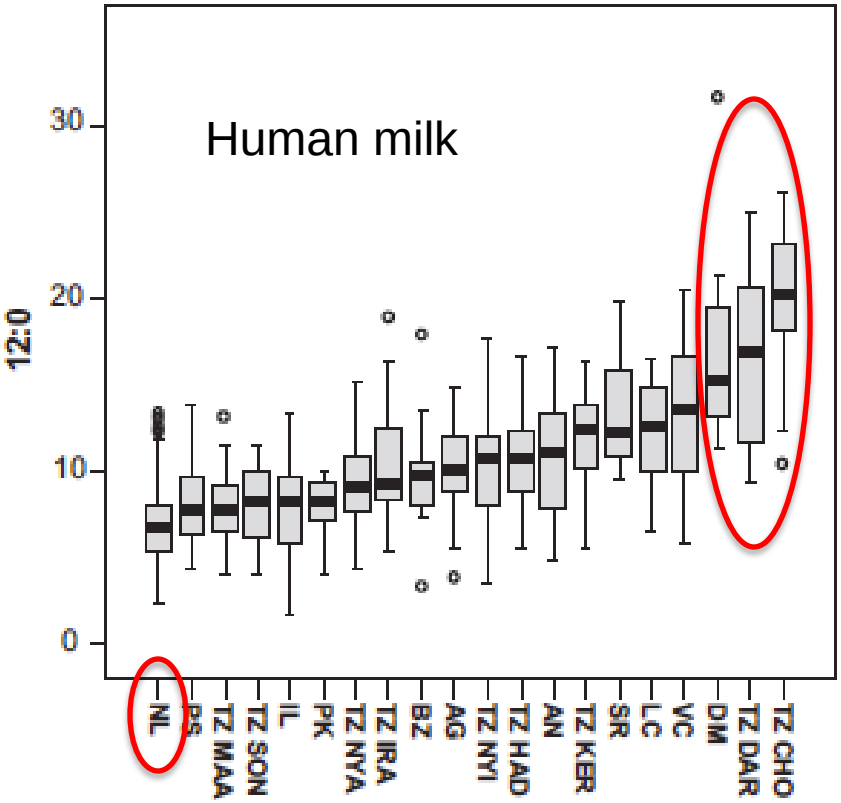
(medium chain saturated fatty acids)

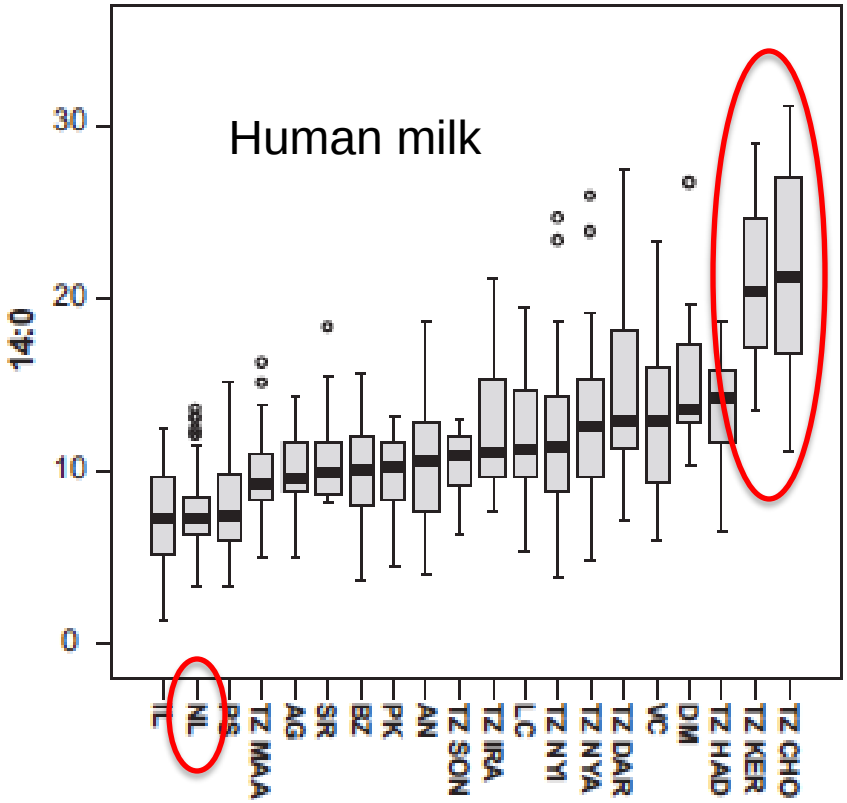


Fatty acid	%
Caproic (C6)	0.97
Caprylic (C8)	5.10
Capric (C10)	3.58
Lauric (C12)	38.05
Myristic (C14)	20.10
Palmitic (C16)	15.20
Stearic (C18)	2.35
Oleic (C18:1)	12.52
Linoleic (C18:2)	2.13

Kokosvet bestaat voornameijk uit: 12:0>14:0>16:0

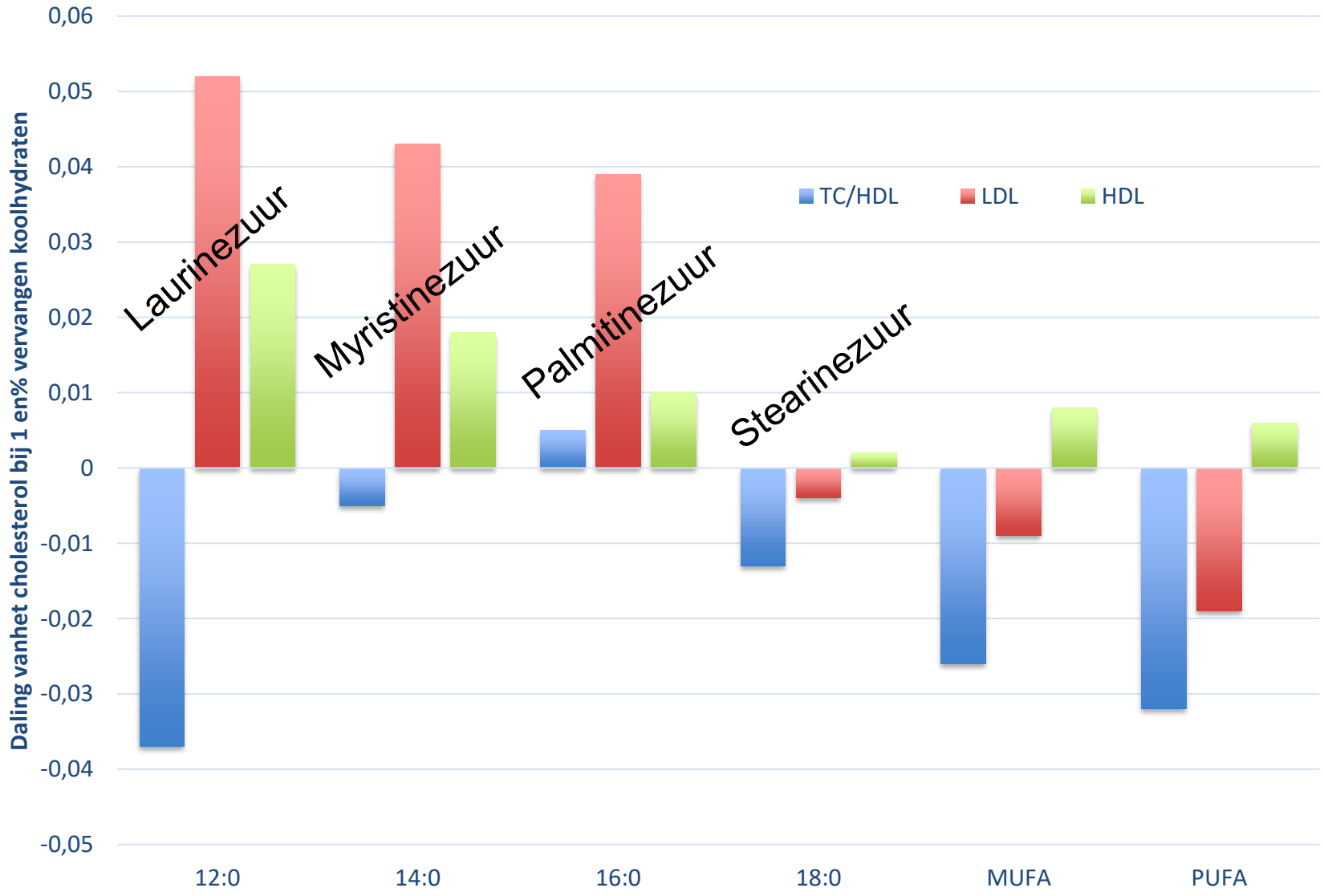
MCFA in Hunter-gatherers





Kuipers, PLEFA, 2007

Vet vs LDL, HDL, en TC/HDL-C



Eet vooral meer 18:0

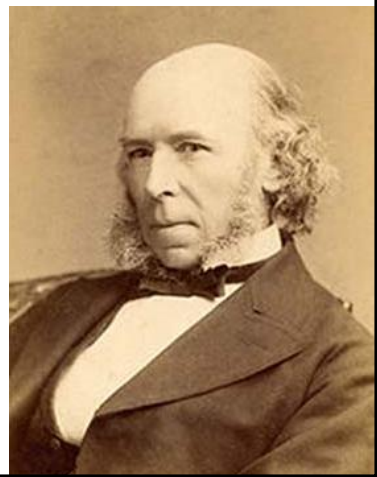
Tabel 2: Vet in spiervlees van runderen met een natuurlijke voeding of op basis van granen

	natuurlijke voeding		voeding o.b.v. granen	
Vet				
	g%	mg/100g	g%	mg/100g
Vet	3,1		5,7	
16:0	27,5	853	26,6	1516
18:0	**14,4**	446	**10,6**	604
Verzadigd	46,8	1451	42,8	2440
MUFA	42,9	1330	50	2850
ALA-ω3	0,58	18,0	0,19	10,8
EPA-ω3	0,11	3,41	-	-
DHA-ω3	-	-	-	-
LA-ω6	1,16	36,0	1,62	92,3
AA-ω6	0,30	9,30	0,16	9,12
ω6/ω3	2,12	2,12	9,37	9,37

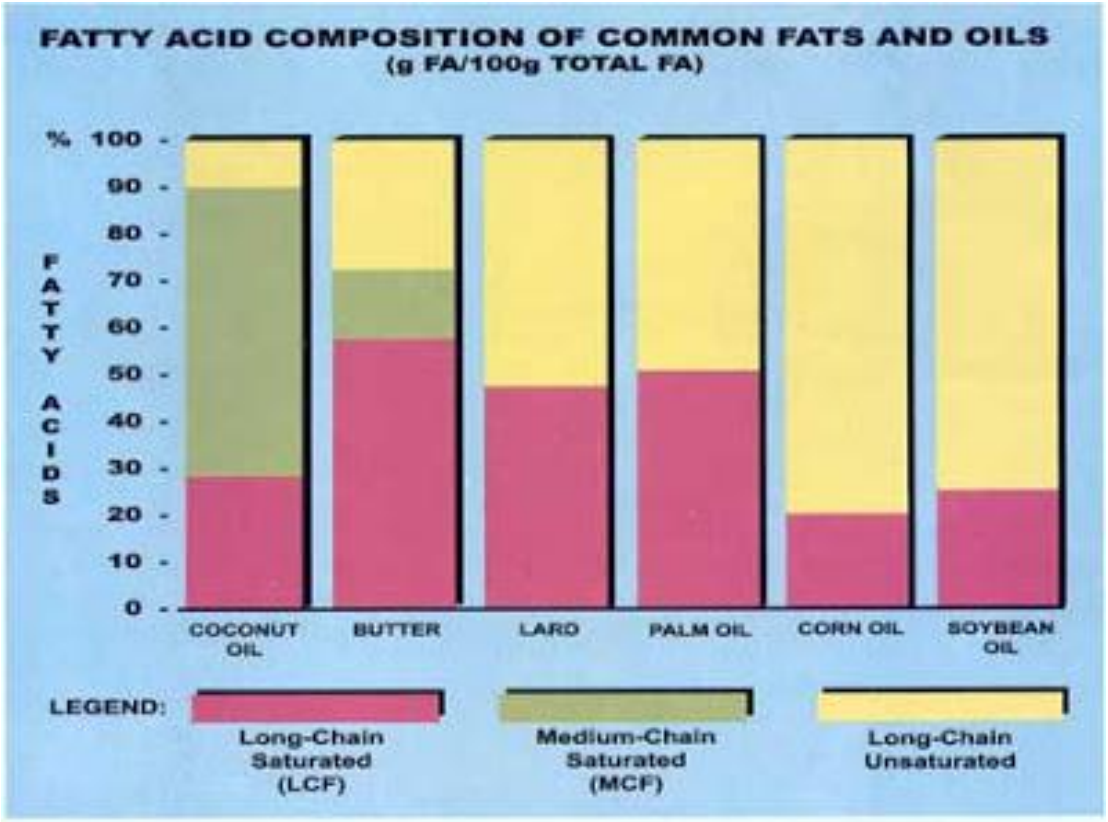
Take home message No. 1:

Kokosolie verhoogt het LDL, heeft weliswaar een gunstig effect op de TC/HDL-ratio maar met ongewist effect.

Beperk liever de inname van verzadigd vet



Maar er is meer dan MCFA -> SCFA (short chain / MCT)



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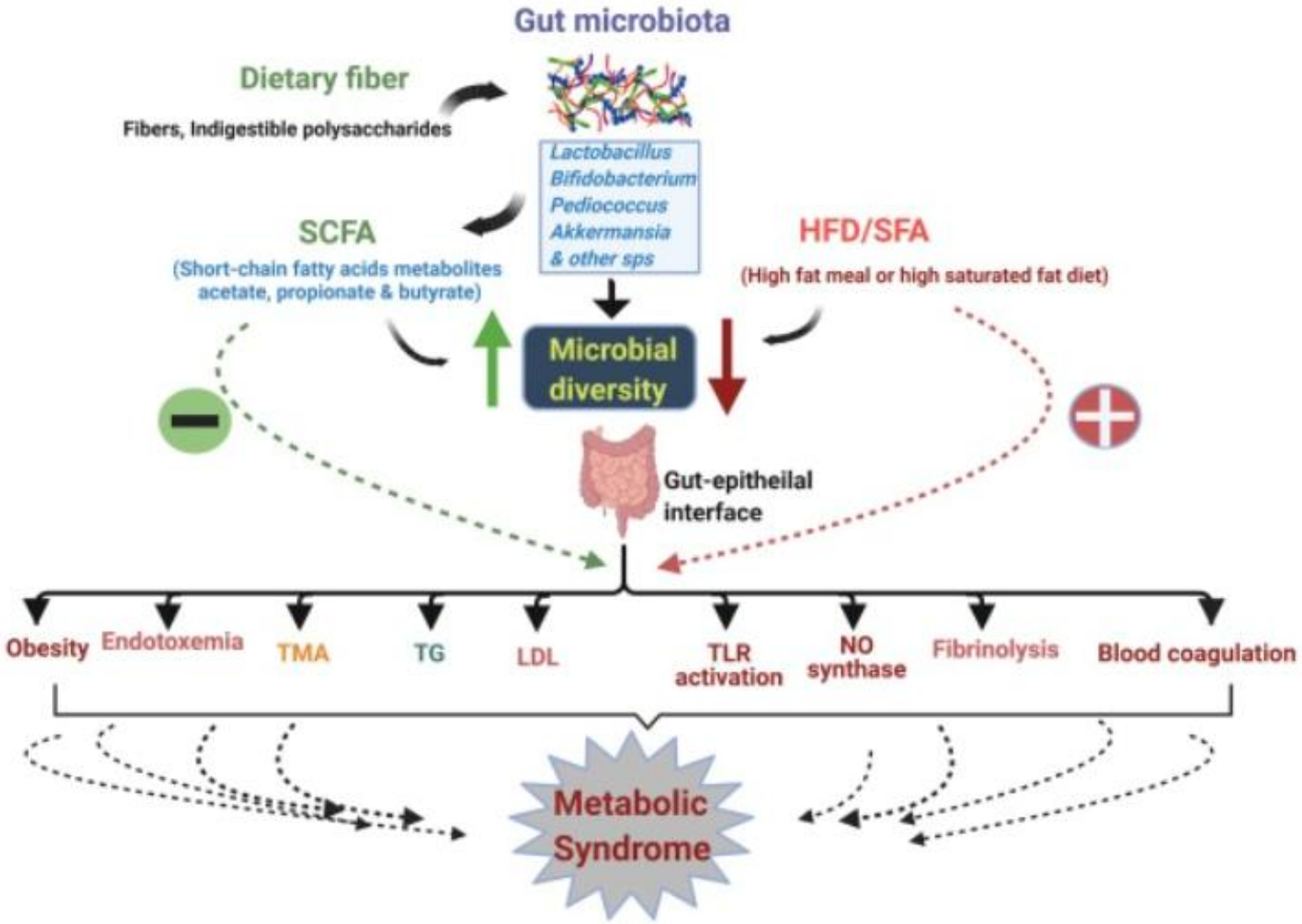
Kokosvet bestaat voornameijk uit: 12:0>14:0>16:0

Zijn MCT relevant?

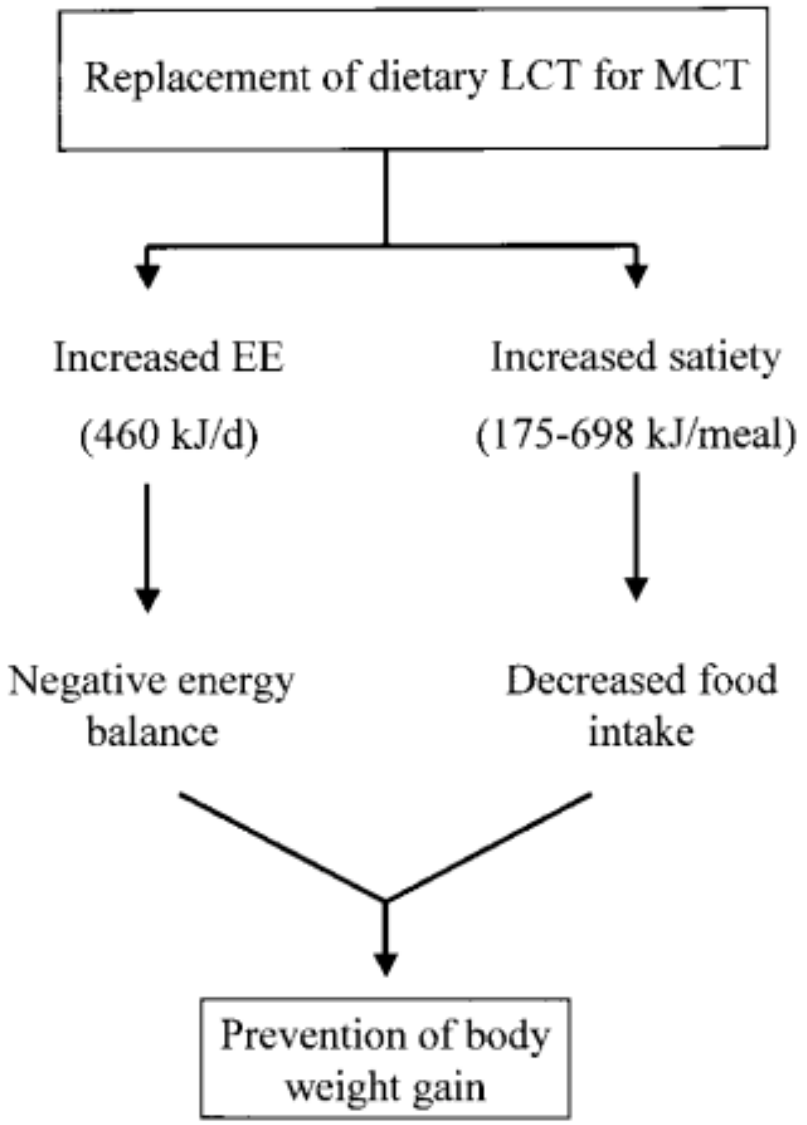


SCFA produced by the gut microbiome from notably fiber increase intestinal integrity and systemic inflammation.

Physiological Effects of Medium-Chain Triglycerides: Potential Agents in the Prevention of Obesity[1]

Marie-Pierre St-Onge and Peter J. H. Jones[2]

School of Dietetics and Human Nutrition, McGill Universi
Ste-Anne-de-Bellevue, Quebec, Canada, H9X 3V9



Pro's
- Increase satiety
- Increase Energy Expenditure

Mechanisms
- Increase production of ketones and B-hydroxybutyrate (anorexigeen)
- Increased leptin / PYY

J. Nutr. 132: 329–332, 2002.

Zijn MCT relevant?

Use of medium chain triglyceride (MCT) oil in subjects with Alzheimer's disease: A randomized, double-blind, placebo-controlled, crossover study, with an open-label extension

Angela G. Juby[1] | Toni E. Blackburn[1] | Diana R. Mager[2]

Abstract

Introduction: Cerebral glucose and insulin metabolism is impaired in Alzheimer's disease (AD). Ketones provide alternative energy. Will medium chain triglyceride (MCT) oil, a nutritional source of ketones, impact cognition in AD?

Alzheimers Dement (N Y); 2022 Mar 14;8(1):e12259.

Zijn MCT relevant?

Use of medium chain triglyceride (MCT) oil in subjects with Alzheimer's disease: A randomized, double-blind, placebo-controlled, crossover study, with an open-label extension

Angela G. Juby[1] | Toni E. Blackburn[1] | Diana R. Mager[2]

Discussion: This is the longest duration MCT AD study to date. Eighty percent had stabilization or improvement in cognition, and better response with 9-month continual MCT oil.

Alzheimers Dement (N Y); 2022 Mar 14;8(1):e12259.

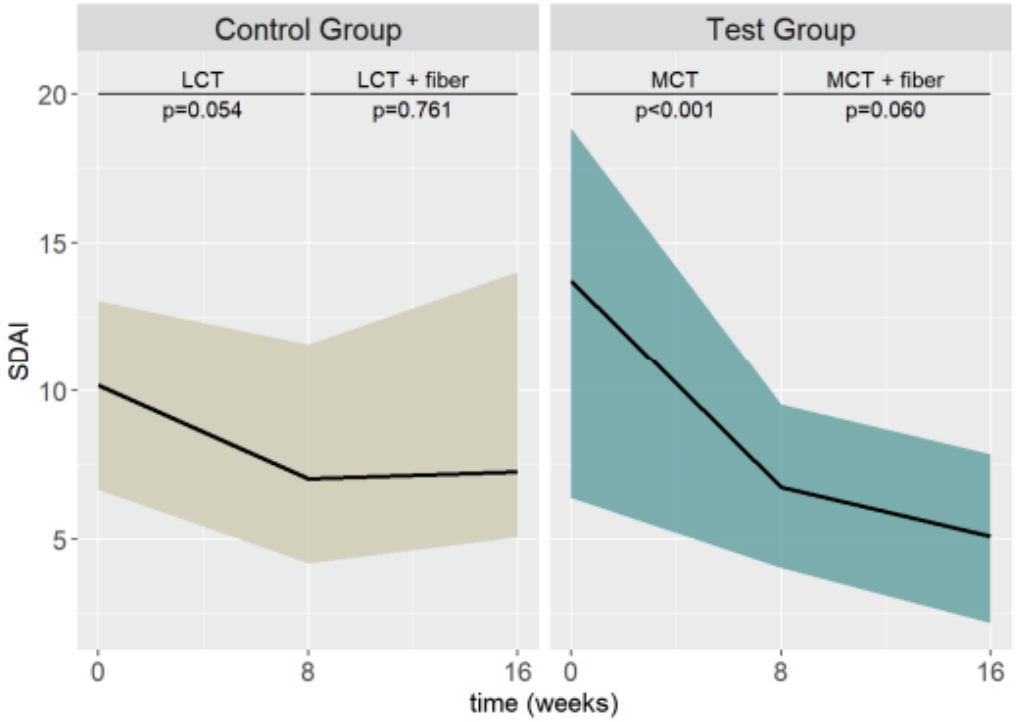
Zijn MCT relevant?

Article

MCT-Induced Ketosis and Fiber in Rheumatoid Arthritis (MIKARA)—Study Protocol and Primary Endpoint Results of the Double-Blind Randomized Controlled Intervention Study Indicating Effects on Disease Activity in RA Patients

Christina Heidt [1,2,*], Jörn Pons-Kühnemann [3], Ulrike Kämmerer [4], Thorsten Marquardt [2] and Monika Reuss-Borst [5,6]

SDAI (Simplified Disease Activity Index)

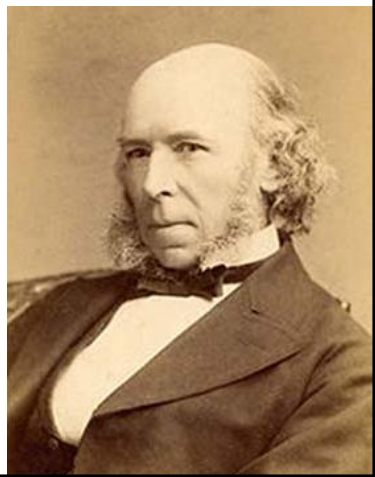


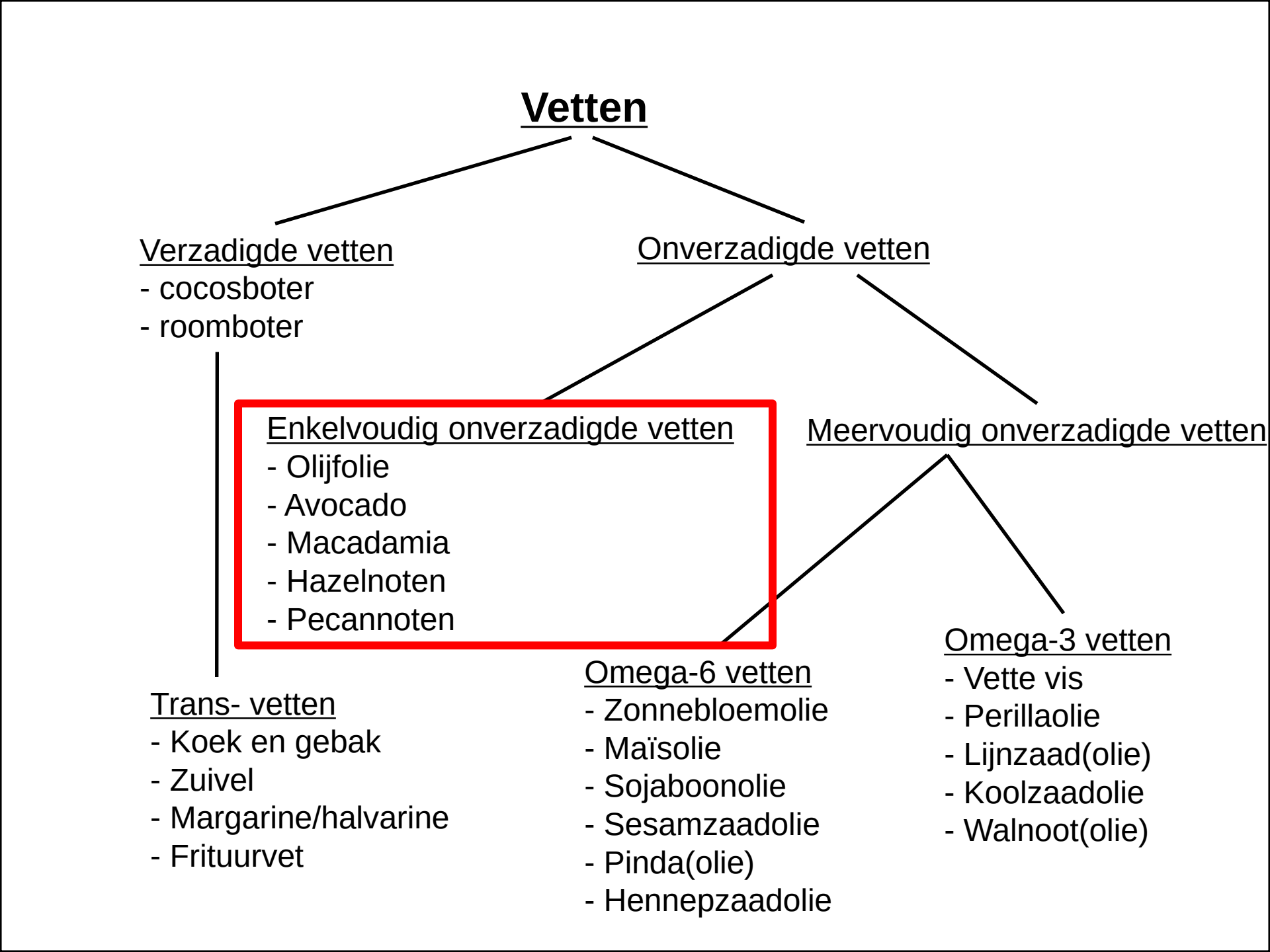
Nutrients **2023**, *15*, 3719. https://doi.org/10.3390/nu15173719

Take home message No. 2:

MCT olie

ondersteunt mogelijk het microbioom,
het darmepitheel en biedt daarmee bescherming
tegen systemische lage-graad ontstekingen




Vetten
Verzadigde vetten
- cocosboter
- roomboter
Onverzadigde vetten
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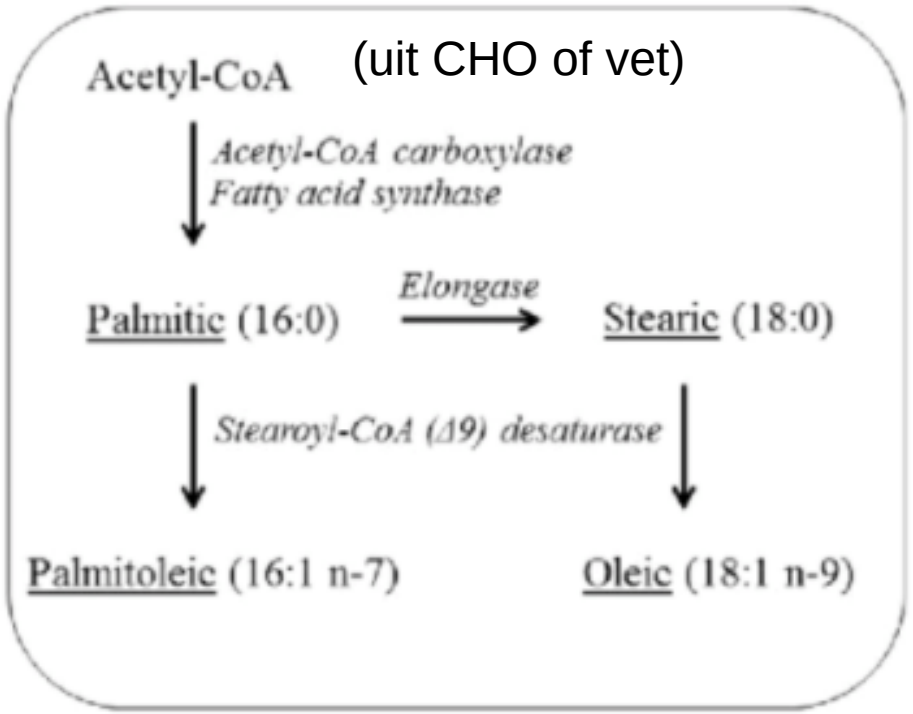
- Margarine/halvarine
- Frituurvet
Omega-6 vetten
- Zonnebloemolie
- Maïsolie
- Sojaboonolie
- Sesamzaadolie
- Pinda(olie)
- Hennepzaadolie
Omega-3 vetten
- Vette vis
- Perillaolie
- Lijnzaad(olie)
- Koolzaadolie
- Walnoot(olie)

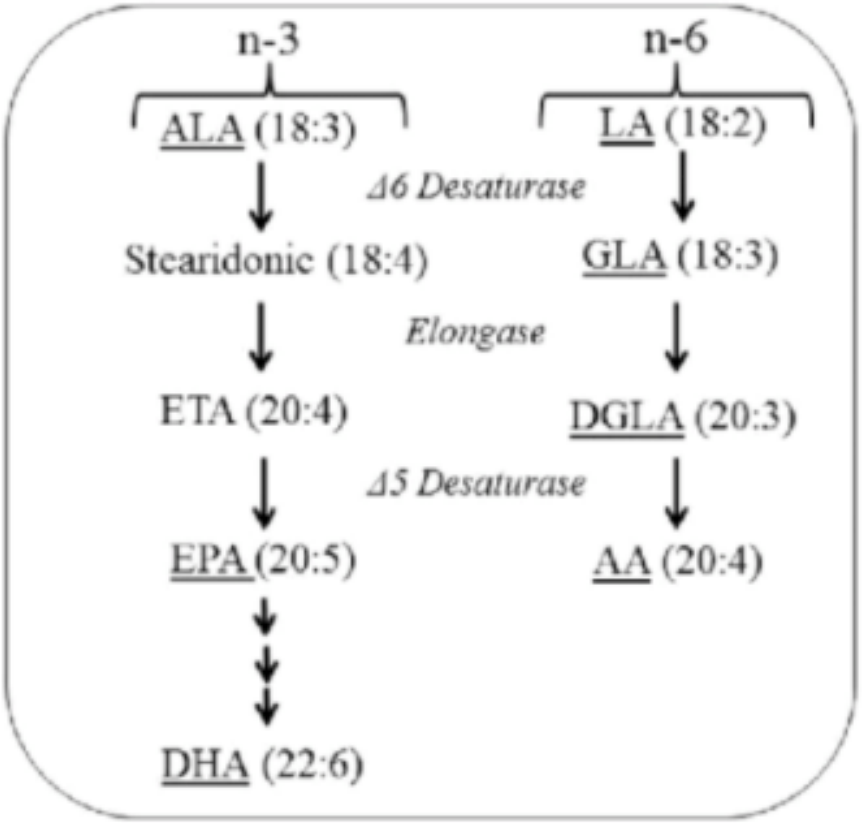
SAFA and MUFA derived from CHO

Verzadigd vet en mono-onverzadigd vet



- Measured fatty acids are underlined
- Enzymes are in *italics*

Omega-3 en omega-6 vet

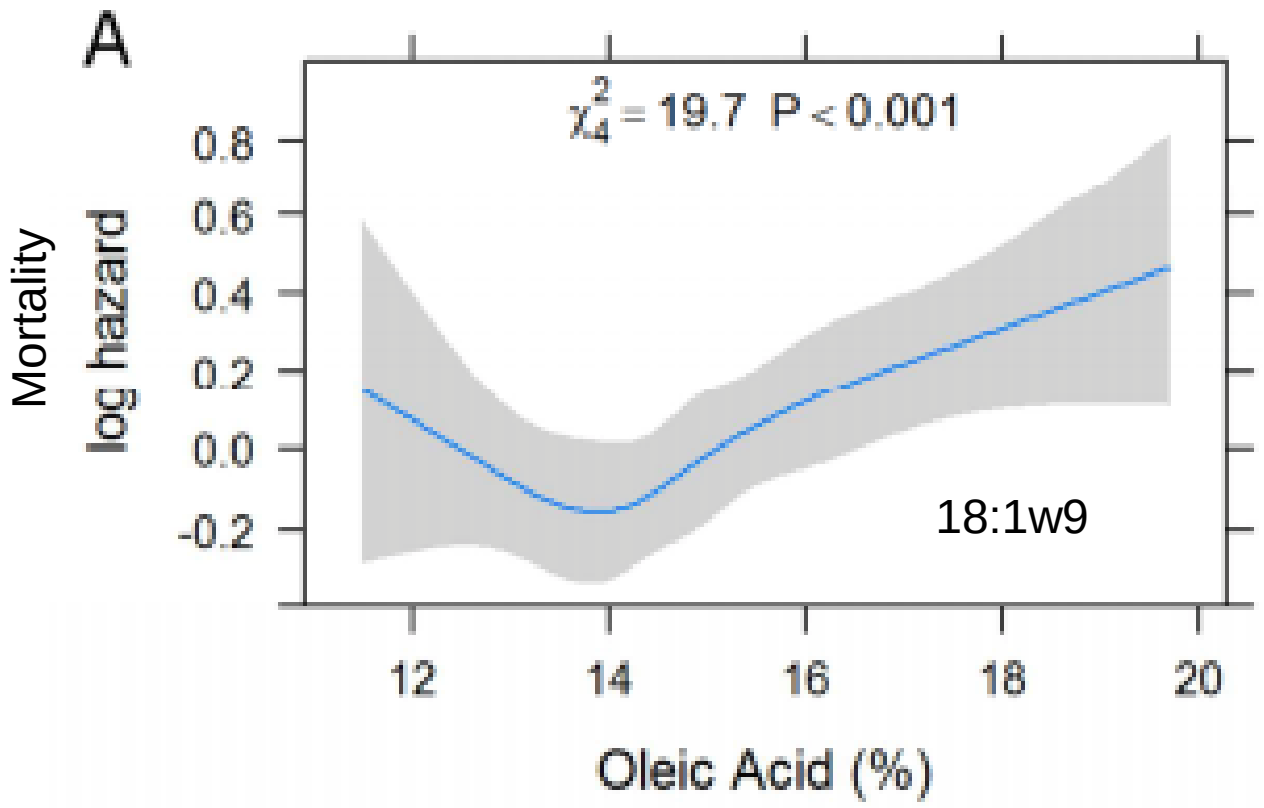


Essentiele vetzuren: EFA

Individual Omega-9 Monounsaturated Fatty Acids and Mortality – The Ludwigshafen Risk and Cardiovascular Health Study

Delgado. J Clin Lipidol 2017;11:126-135

Graciela E. Delgado[a], Bernhard K. Krämer[a], Stefan Lorkowski[b,c], Winfried März[a,d,e], Clemens von Schacky[f,g], Marcus E. Kleber[a,b,c]



Suppletie met omega-9 vetten?

The NEW ENGLAND JOURNAL of MEDICINE

This article was published on June 13, 2018,

ORIGINAL ARTICLE

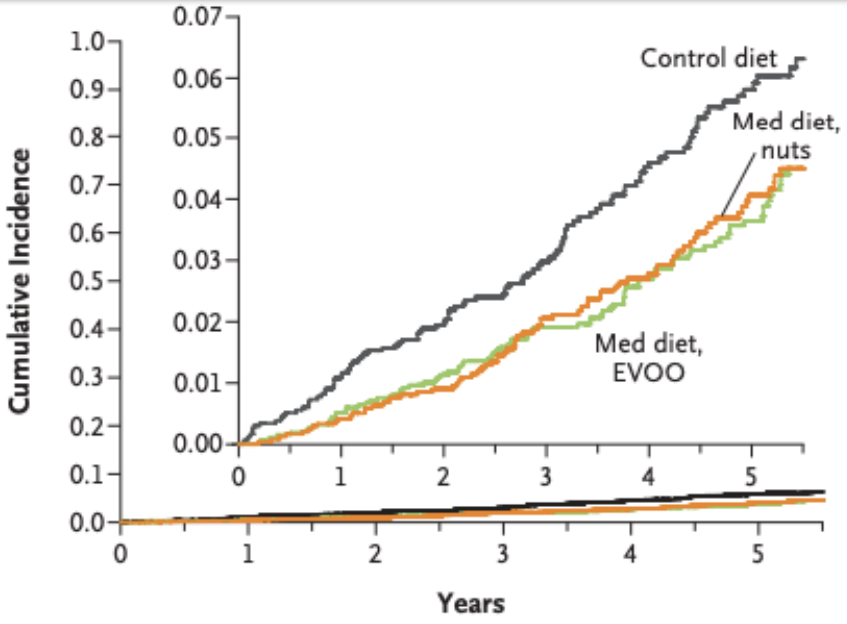
Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

Ramón Estruch, M.D., Ph.D., Emilio Ros, M.D., Ph.D.,
Maria-Isabel Covas, D.Pharm., Ph.D., Dolor
Fernando Arós, M.D., Ph.D., Enrique Gó
Valentina Ruiz-Gutiérrez, Ph.D., Miquel Fiol, M.D.,
Rosa Maria Lamuela-Raventos, D.Pharm., Ph.D.,
Xavier Pintó, M.D., Ph.D., Josep Basora, M.D., Ph.D.,
José V. Sorlí, M.D., Ph.D., José Alfredo Martín
Miguel Angel Martínez-González, M.D., Ph.D., for th

Food
Mediterranean diet
Recommended
Olive oil*
Tree nuts and peanuts†
Fresh fruits
Vegetables
Fish (especially fatty fish), seafood
Legumes
Sofrito‡
White meat
Wine with meals (optionally, only for habitual drink

A Primary End Point (acute myocardial infarction, stroke, or death from cardiovascular causes)

Med diet, EVOO: hazard ratio, 0.69 (95% CI, 0.53–0.91)
Med diet, nuts: hazard ratio, 0.72 (95% CI, 0.54–0.95)



No. at Risk

Control diet	2450	2268	2020	1583	1268	946
Med diet, EVOO	2543	2486	2320	1987	1687	1310
Med diet, nuts	2454	2343	2093	1657	1389	1031

The NEW ENGLAND JOURNAL of MEDICINE

This article was published on June 13, 2018,

ORIGINAL ARTICLE

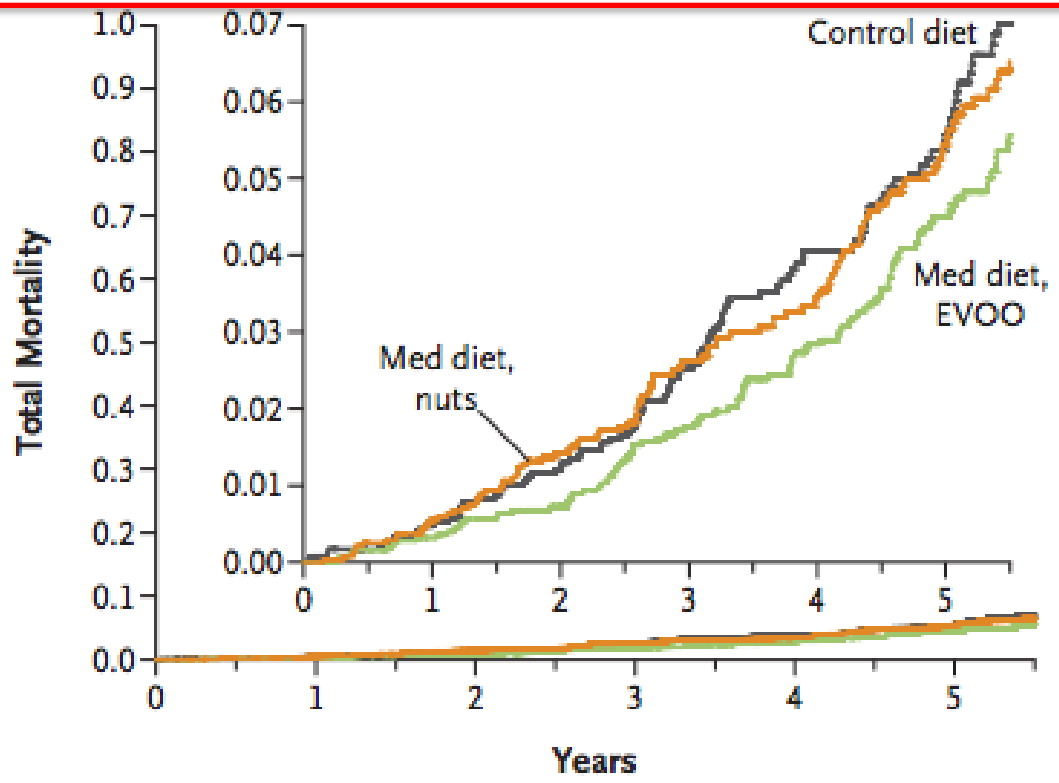
Primary Preve
Disease with

Ramón Estruch, M.D., Ph.D., Em
Maria-Isabel Covas, D.Pha
Fernando Arós, M.D., F
Valentina Ruiz-Gutiérrez, Ph.D.,
Rosa Maria Lamuela-Raventos,
Xavier Pintó, M.D., Ph.D., Josep B
José V. Sorlí, M.D., Ph.D., Jo
Miguel Angel Martínez-González

Food
Mediterranean diet
Recommended
Olive oil*
Tree nuts and peanuts†
Fresh fruits
Vegetables
Fish (especially fatty fish), s
Legumes
Sofrito‡
White meat
Wine with meals (optionally,

B Total Mortality

Med diet, EVOO: hazard ratio, 0.90 (95% CI, 0.69–1.18)
Med diet, nuts: hazard ratio, 1.12 (95% CI, 0.86–1.47)



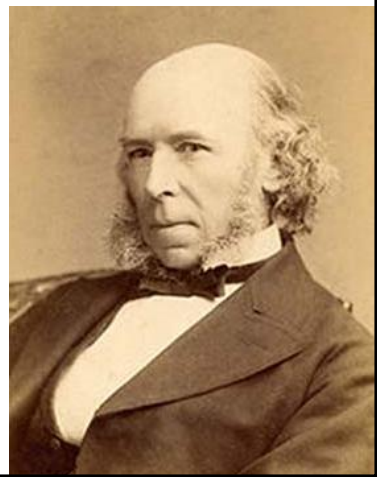
No. at Risk

Control diet	2450	2270	2027	1586	1272	949
Med diet, EVOO	2543	2486	2324	1991	1691	1310
Med diet, nuts	2454	2345	2097	1662	1395	1037

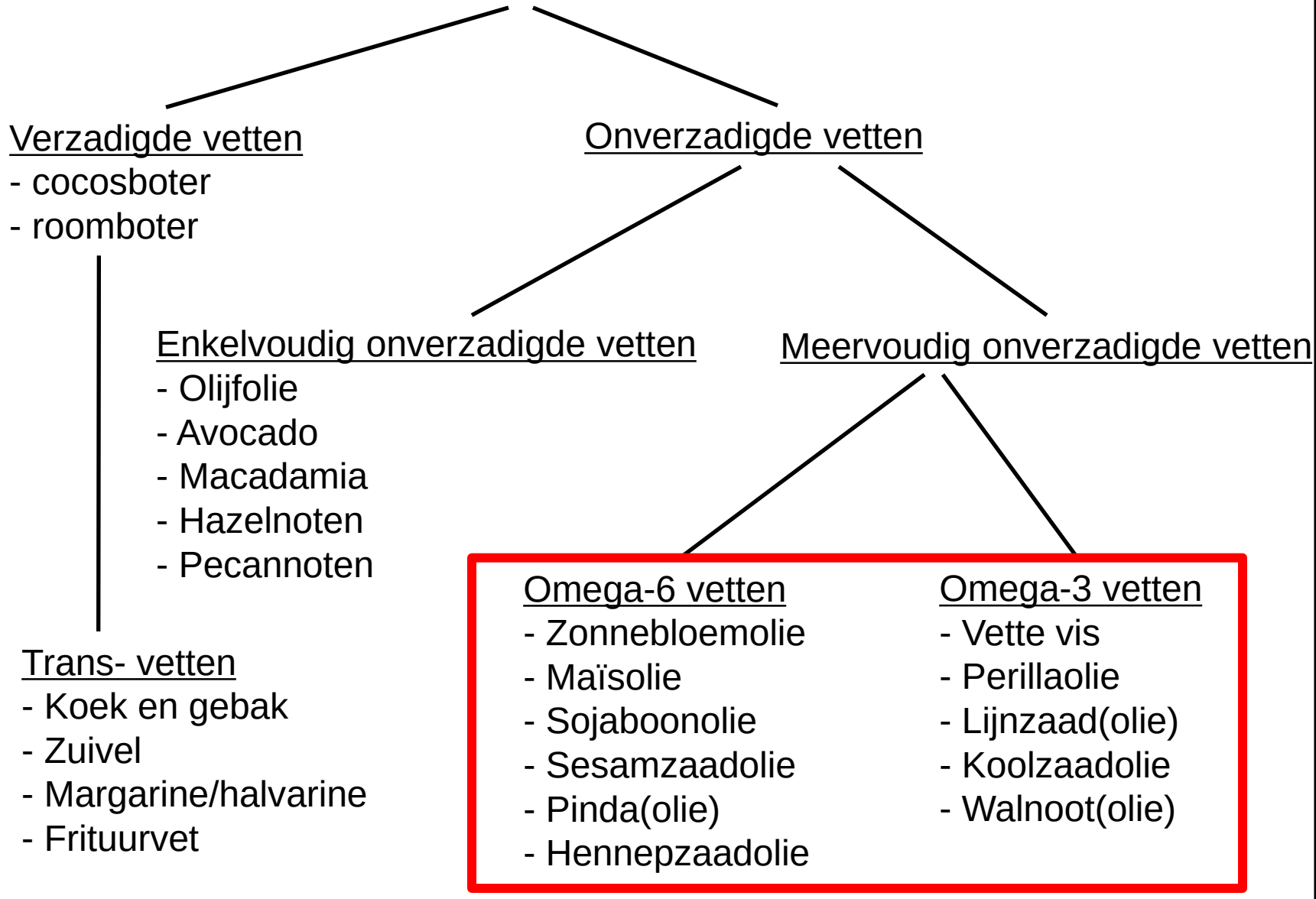
Take home message No. 3:

Oliezuur / olijfolie:

waarschijnlijk de gezondste keuze om te gebruiken als olie, zowel in koude als warme gerechten



Vetten

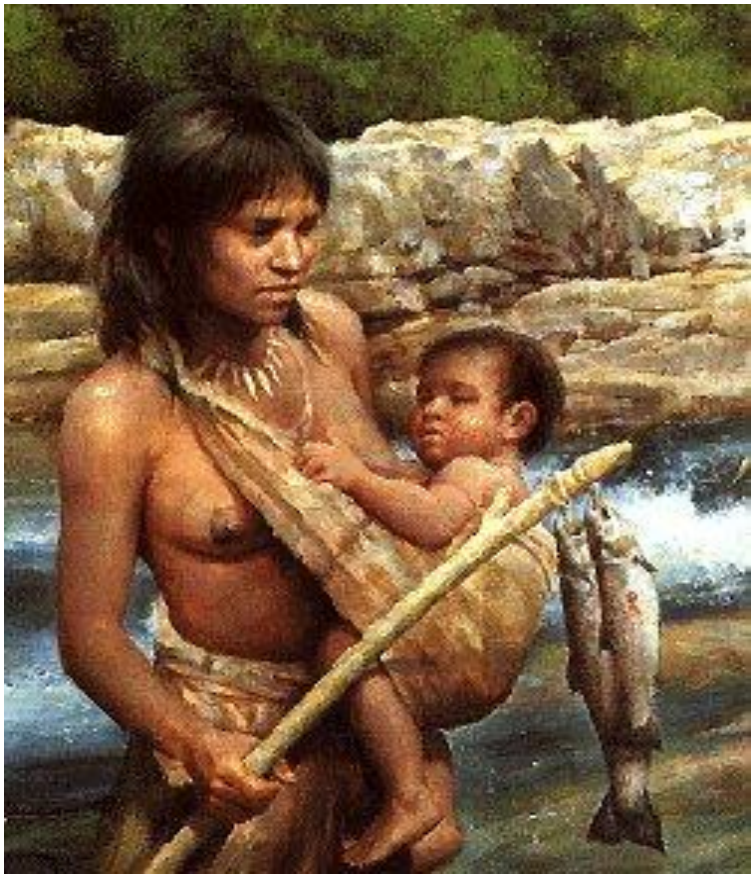

Verzadigde vetten
- cocosboter
- roomboter
Onverzadigde vetten
Enkelvoudig onverzadigde vetten
- Olijfolie
- Avocado
- Macadamia
- Hazelnoten
- Pecannoten
Meervoudig onverzadigde vetten
Trans- vetten
- Koek en gebak
- Zuivel
- Margarine/halvarine
- Frituurvet
Omega-6 vetten
- Zonnebloemolie
- Maïsolie
- Sojaboonolie
- Sesamzaadolie
- Pinda(olie)
- Hennepzaadolie
Omega-3 vetten
- Vette vis
- Perillaolie
- Lijnzaad(olie)
- Koolzaadolie
- Walnoot(olie)

Waar zitten ze in?

Omega-6 vetten

Land-vetten

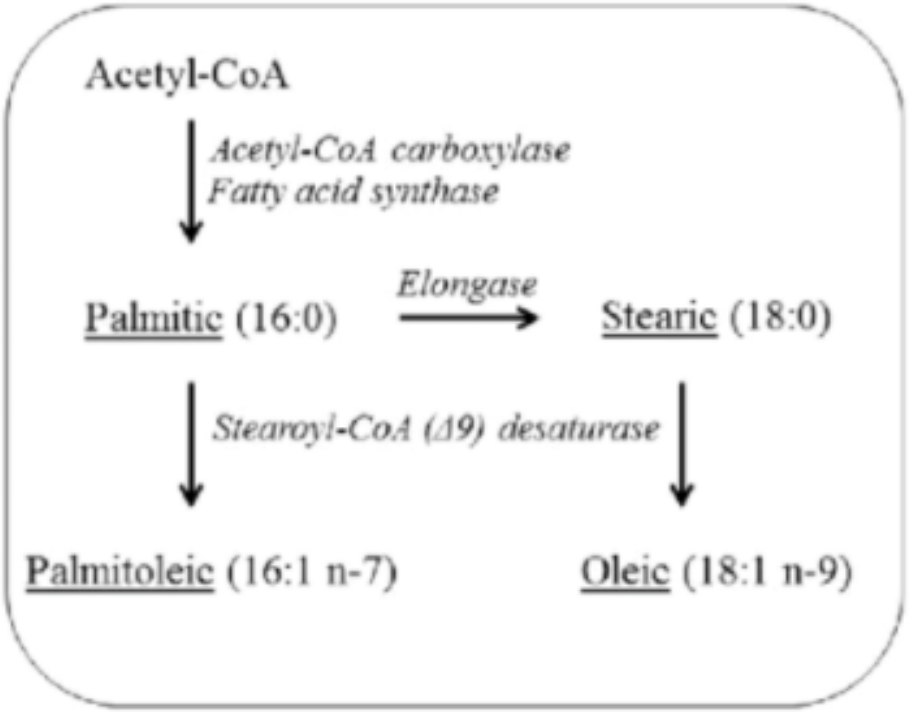
Omega-3 vetten



Water-vetten

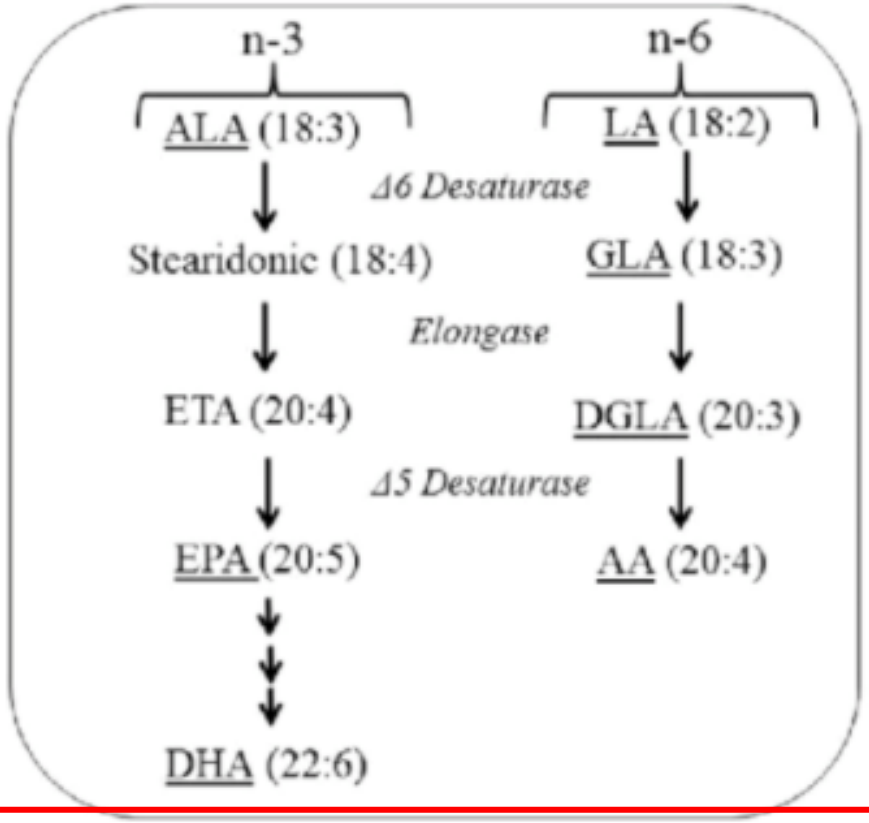
Vetzuur biochemie

Verzadigd vet en mono-onverzadigd vet



- Measured fatty acids are underlined
- Enzymes are in *italics*

Omega-3 en omega-6 vet



Essentiele vetzuren: EFA

Advies *American Heart Association*

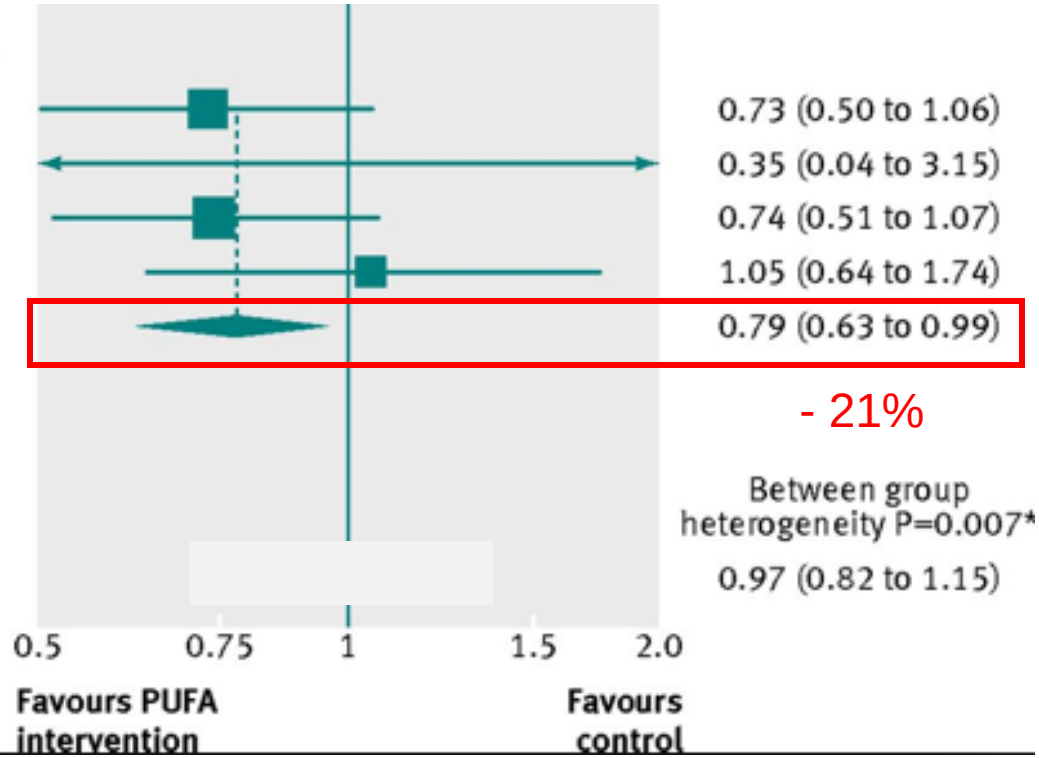
- ”The consumption of at least 5-10% of energy from omega-6 PUFA reduces the risk of CHD

- *<u>Advice is based on</u>*:
  - Studies that consist of trials in which SAFA were replaced by PUFA (almost entirely omega-6*)
  - *: PUFA also consisted of omega-3 fatty acids from omega-3 oils and fish/cod liver oil

(*Circulation*. 2009;119:902-907.)

Advies AHA

- *Advice is based on*:
  - Studies that consist of trials in which SAFA were replaced by PUFA (almost entirely omega-6*)
  - *: PUFA also consisted of omega-3 fatty acids from omega-3 oils and fish/cod liver oil

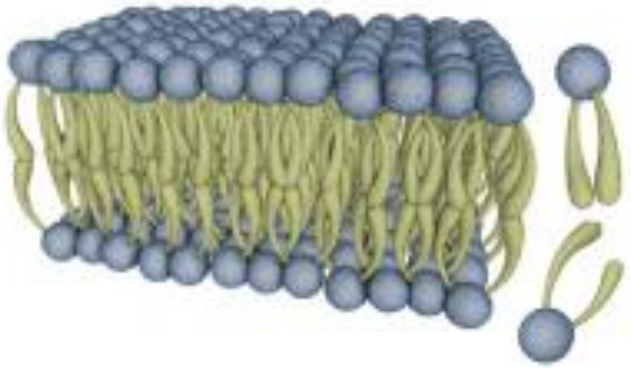


Ramsden, BJN, 2010, Ramsden BMJ 2014

Advies:
Vervang SAFA door LCPw6

Eens?

Wat doen omega-3 en omega-6?



Arachidonzuur

Docosahexaeenzuur

Omega-6 vetten

NSAID, aspirine

-

Cyclo-oxigenase; COX

Omega-3 vetten

Prostaglandine H2

Prostaglandine H3

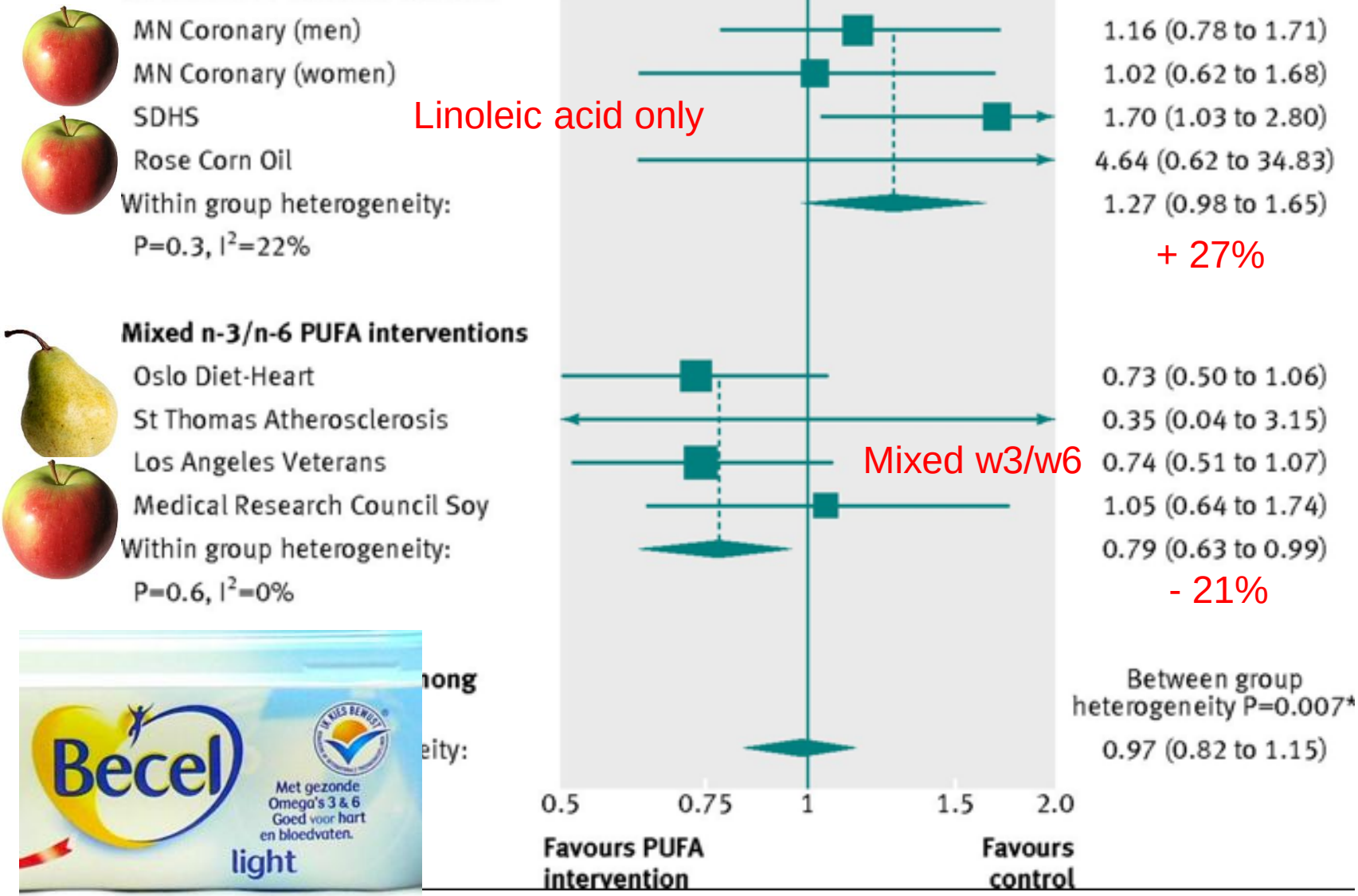
PGE2 (pro-inflammatoir)
TxA2 (pro-trombotisch)
vasoconstrictie

PGI3 (anti-inflammatoir)
TxA3 (anti-trombotisch)
vasodilatatie

Advies:
Vervang SAFA door LCPw6

(Nog steeds) mee (on)eens?

Liever appels of peren?



Ramsden, BJN, 2010, Ramsden BMJ 2014

The NEW ENGLAND JOURNAL of MEDICINE

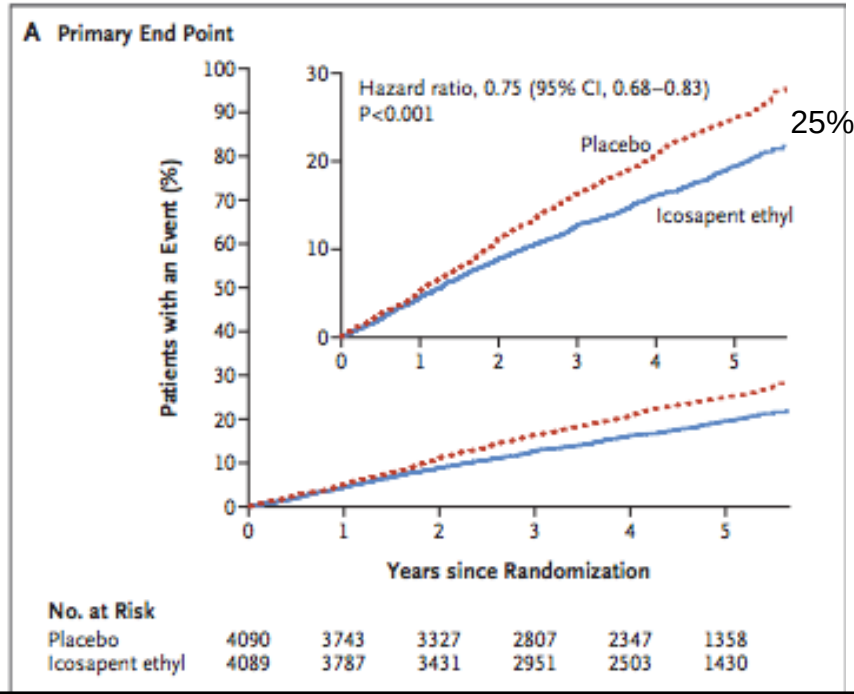
ESTABLISHED IN 1812 JANUARY 3, 2019 VOL. 380 NO. 1

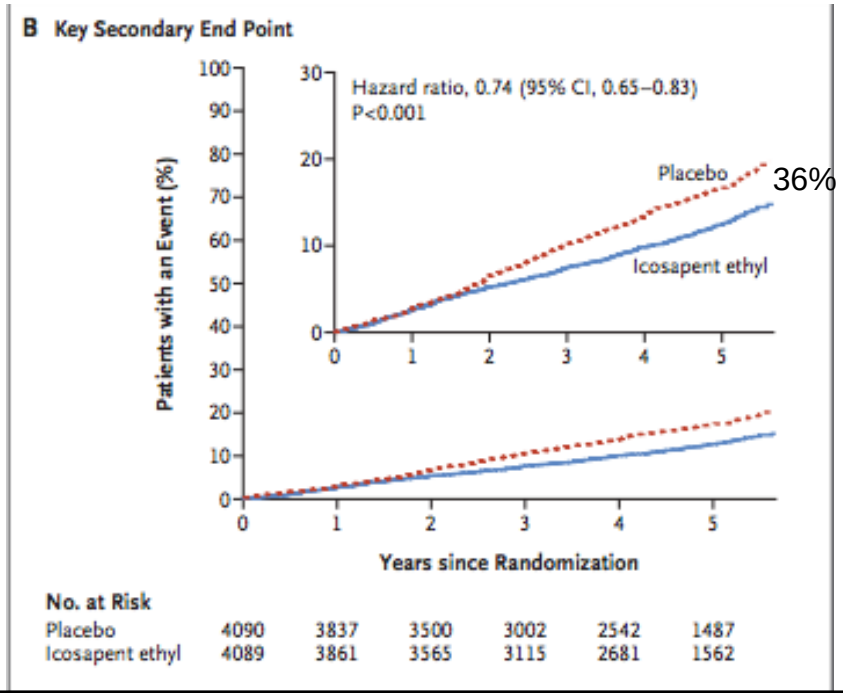
Cardiovascular Risk Reduction with Icosapent Ethyl for Hypertriglyceridemia

Deepak L. Bhatt, M.D., M.P.H., P. Gabriel Steg, M.D., Michael Miller, M.D., Eliot A. Brinton, M.D., Terry A. Jacobson, M.D., Steven B. Ketchum, Ph.D., Ralph T. Doyle, Jr., B.A., Rebecca A. Juliano, Ph.D., Lixia Jiao, Ph.D., Craig Granowitz, M.D., Ph.D., Jean-Claude Tardif, M.D., and Christie M. Ballantyne, M.D., for the REDUCE-IT Investigators*

CVD-death; non-fatal MI; non-fatal stroke; *revasc; unstable angina*

CVD-death; non-fatal MI; non-fatal stroke





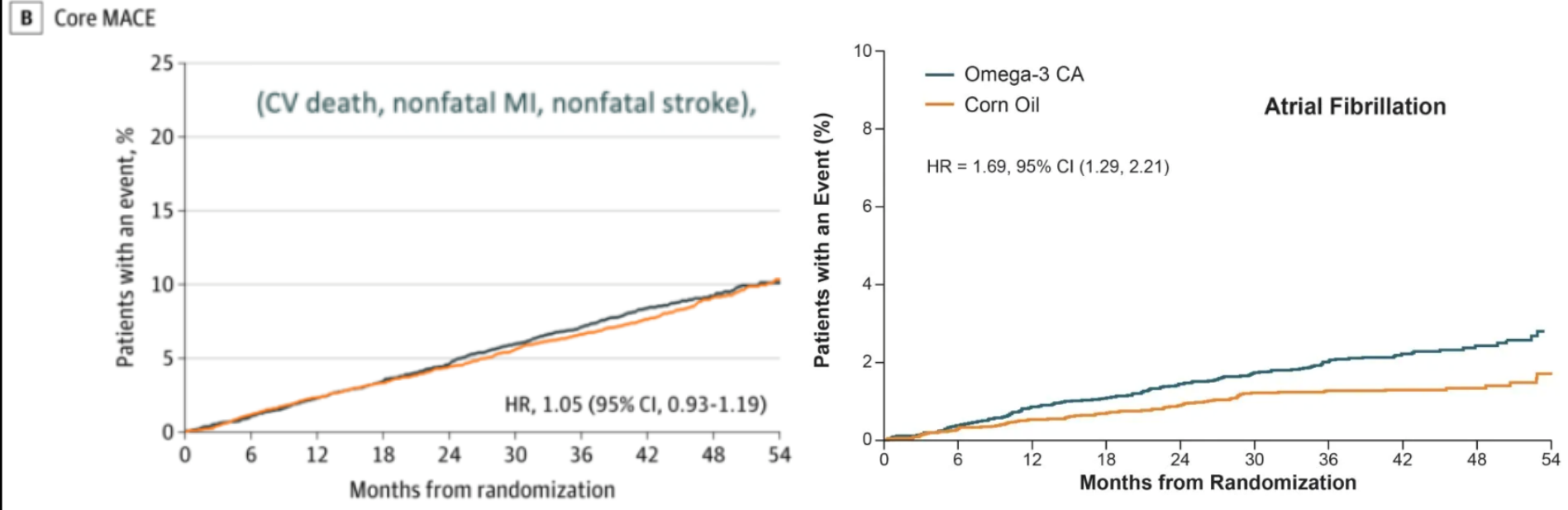
Effect of High-Dose Omega-3 Fatty Acids vs Corn Oil on Major Adverse Cardiovascular Events in Patients at High Cardiovascular Risk

The STRENGTH Randomized Clinical Trial

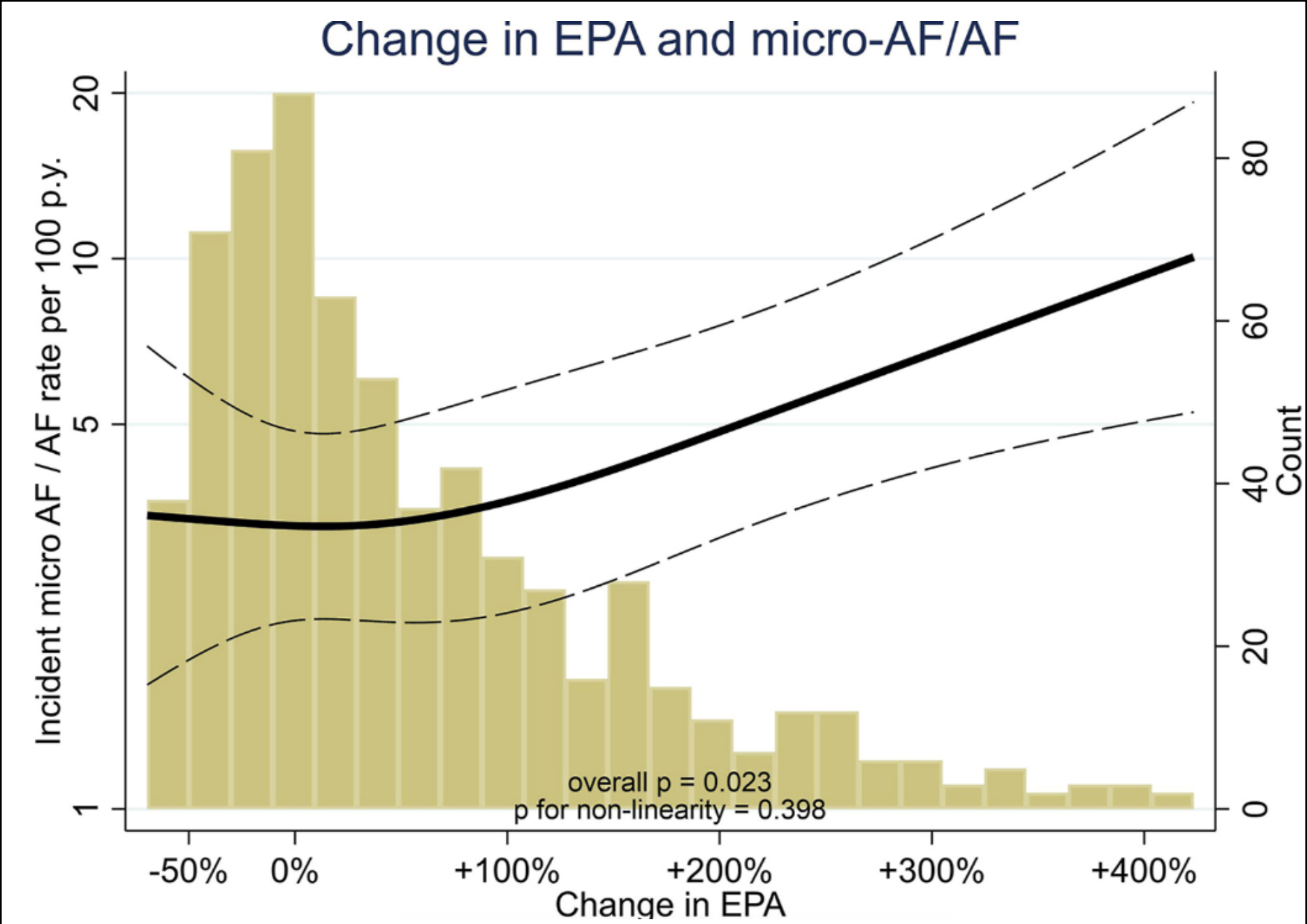
JAMA. 2020;324(22):2268-2280.

Stephen J. Nicholls, MBBS, PhD[1]; A. Michael Lincoff, MD[2]; Michelle Garcia, RN, BSN, CCRC[2]; et al

Interventions Participants were randomized to receive 4 g/d of omega-3 CA (n = 6539) or corn oil, which was intended to serve as an inert comparator (n = 6539), in addition to usual background therapies, including statins.



Conclusions and Relevance Among statin-treated patients at high cardiovascular risk, the addition of omega-3 CA, compared with corn oil, to usual background therapies resulted in no significant difference in a composite outcome of major adverse cardiovascular events.



Peder L. et al. Clinical Nutrition, 42, 9, 1657-60, 2023

Omega-3 Fatty Acids and Heart Rhythm, Rate, and Variability in Atrial Fibrillation

Philipp Baumgartner, MD ; Martin F. Reiner, MD, PhD ; Andrea Wiencierz, PhD ; Michael Coslovsky, PhD ; Nicole R. Bonetti, MD; Mark G. Filipovic, MD; Stefanie Aeschbacher, PhD ; Michael Kühne, MD ; Christine S. Zuern, MD ; Nicolas Rodondi, MD, MAS ; Jolanda Oberle, MD ; Giorgio Moschovitis, MD ; Thomas F. Lüscher, MD ; Giovanni G. Camici, PhD ; Stefan Osswald, MD ; David Conen, MD, MPH ; Jürg H. Beer, MD the SWISS-AF Investigators*

BACKGROUND: Previous randomized control trials showed mixed results concerning the effect of omega-3 fatty acids (n-3 FAs) on atrial fibrillation (AF). The associations of n-3 FA blood levels with heart rhythm in patients with established AF are unknown. The goal of this study was to assess the associations of total and individual n-3 FA blood levels with AF type (paroxysmal versus nonparoxysmal), heart rate (HR), and HR variability in patients with AF.

Table 3. Associations of n-3 FAs With Clinical End Points (Table view)

Prevalence of NPAF	Model 1	Model 2
EPA	1.00 (0.70–1.44)	0.99 (0.67–1.45)
DHA	0.89 (0.78–1.00)	0.93 (0.82–1.06)
DPA	0.92 (0.65–1.30)	1.07 (0.74–1.54)
ALA	1.23 (0.56–2.79)	1.44 (0.63–3.41)
Total omega-3 fatty acids	0.92 (0.85–0.99)	0.97 (0.89–1.05)

Journal of the American Heart Association

Volume 12, Issue 11, 6 June 2023

NPAF=nonparoxysmal atrial fibrillation

Effects of Randomized Treatment With Icosapent Ethyl and a Mineral Oil Comparator on Interleukin-1β, Interleukin-6, C-Reactive Protein, Oxidized Low-Density Lipoprotein Cholesterol, Homocysteine, Lipoprotein(a), and Lipoprotein-Associated Phospholipase A2: A REDUCE-IT Biomarker Substudy

Circulation

Volume 146, Issue 5, 2 August 2022; Pages 372-379

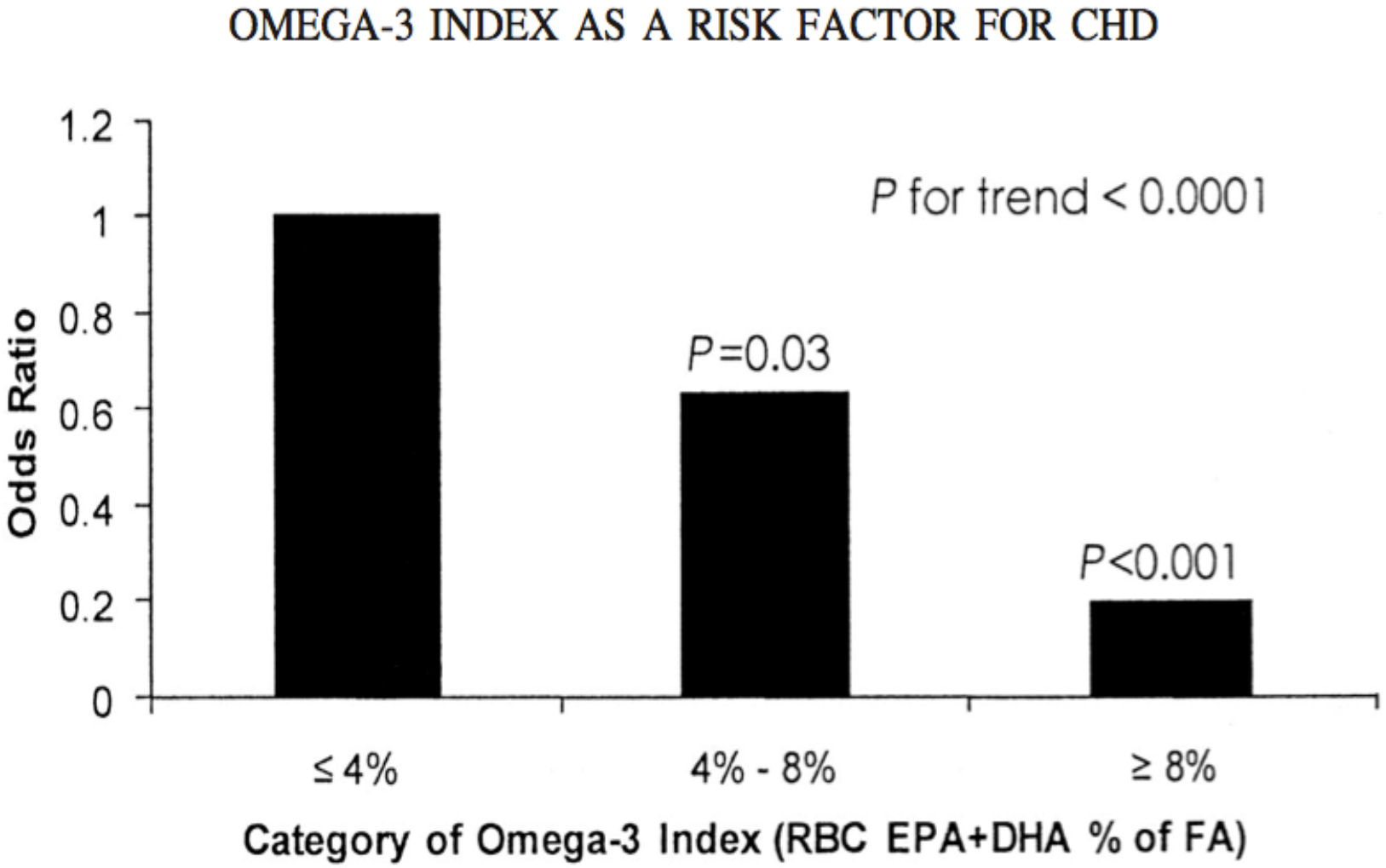
Conclusions: Among participants in REDUCE-IT, allocation to icosapent ethyl had minimal effects on a series of biomarkers associated with atherosclerotic disease, whereas levels increased among those allocated to mineral oil. The effect of these findings on interpretation of the overall risk reductions in clinical events observed within REDUCE-IT is uncertain.

Randomized Control Trial	Population	Omega-3 Dose	Placebo	Outcomes	
JELIS (2007)[3]	• n = 18,645 • total cholesterol > 6.5 mmol/L • on statins	EPA 1800 mg/day	Statin only	Significant reduction in MACE in patients with history of CAD	
ORIGIN (2012)[4]	• n = 12,536 • impaired fasting glucose or diabetes • high risk CV events	EPA + DHA 840 mg/day	Olive oil	No significant difference in rate of CV events	
ASCEND (2018)[5]	• n = 15,480 • with diabetes • no atherosclerotic CV disease	EPA + DHA 840 mg/day	Olive oil	No significant difference in risk of serious CV events	
VITAL (2019)[6]	• n = 25,871 • ♂ > 50 yo, ♀ > 55 yo	EPA + DHA 840 mg/day	Olive oil	No significant difference in incidence of MACE or cancer	
REDUCE-IT (2019)[7]	• n = 8,179 • with CV disease or with diabetes and other risk factors • on statins • fasting TG of 41-100 mg/dL	EPA 2 g twice daily (total 4 g/day)	Light paraffin oil	Significantly lower risk of ischemic events, including CV death	

STRENGTH TRIAL RELEVANT LITERATURE

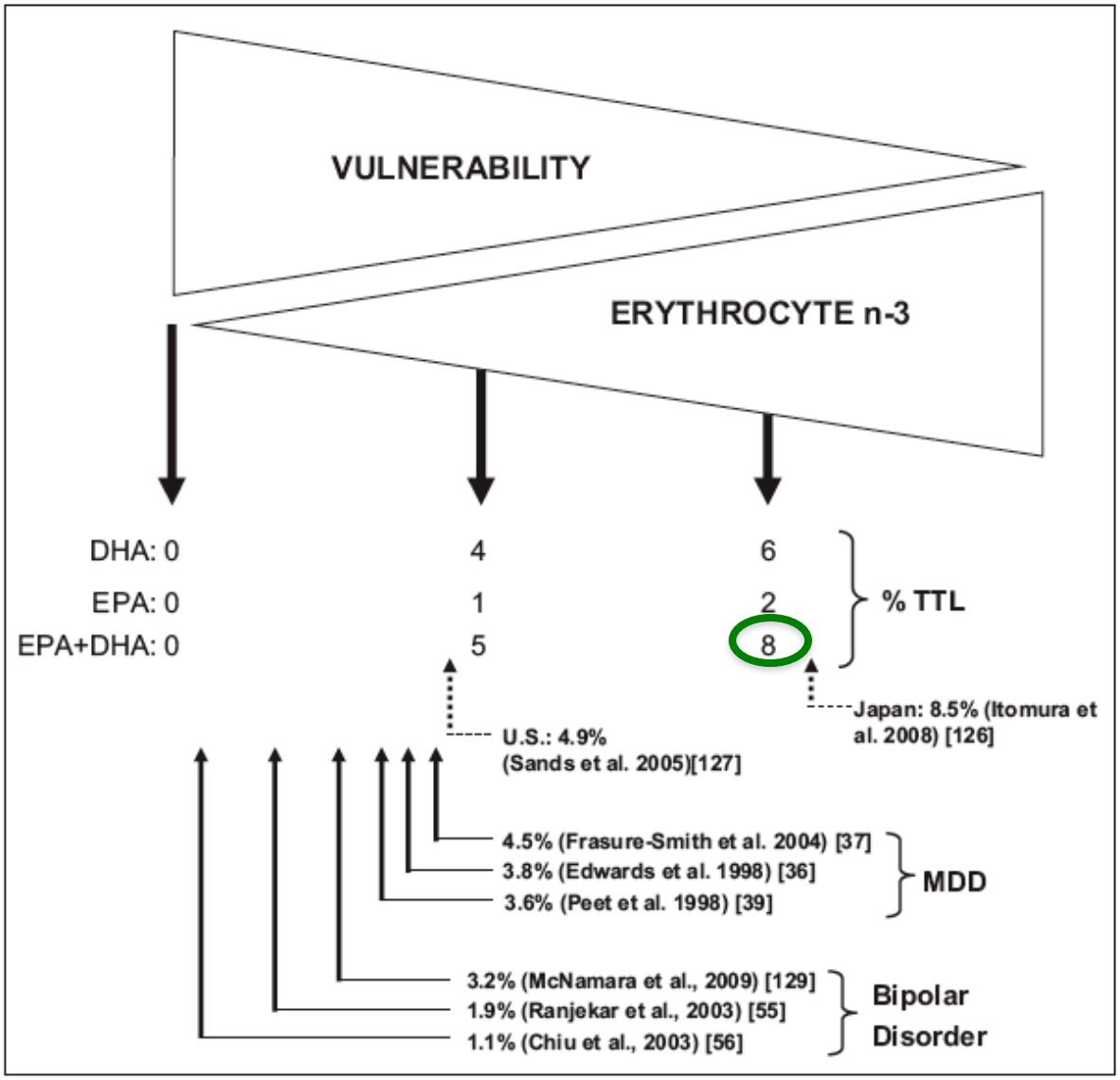
Source: https://www.cardionerds.com/cardsjc-strength-trial/

Omega-3 index en HVZ risico



Harris WS. The omega-3 index as a risk factor for coronary heart disease. American Journal of Clinical Nutrition 2008;87(6):1997S–2002S.

EPA + DHA in psychiatrie



McNamara PLEFA 2009

Suppleren dus met LC-PUFA?

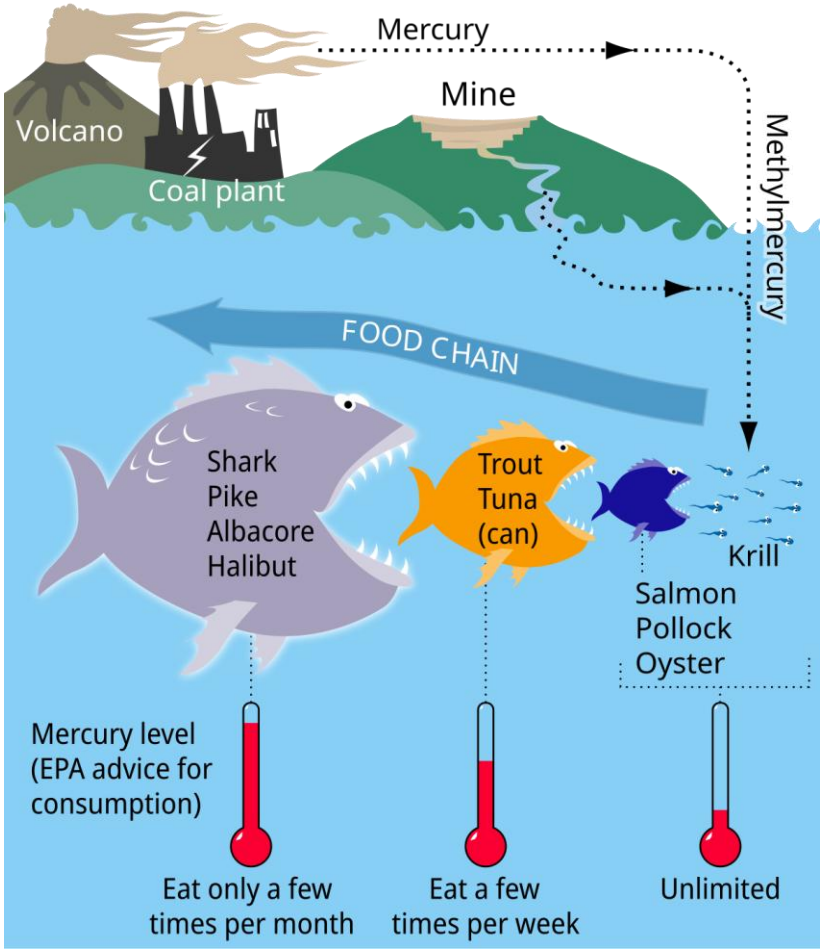
Nee, eet meer vis

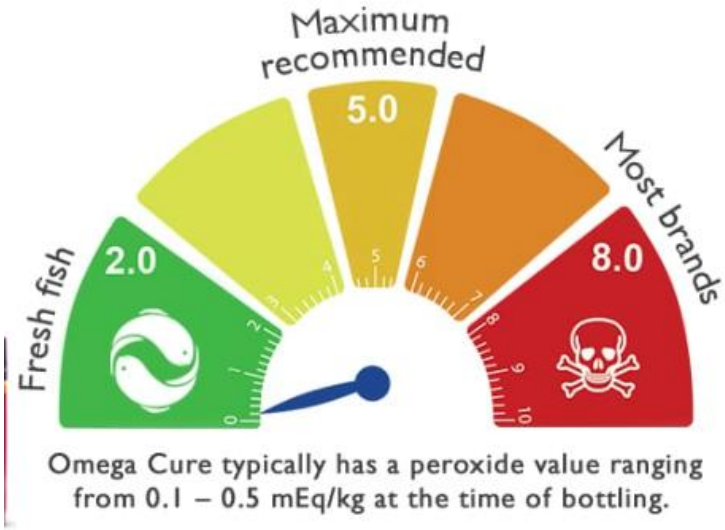
Vis is onderdeel van een gezonde voeding. Het staat in de Schijf van Vijf. Vis is goed voor de gezondheid. Visvetzuren zijn goed voor je hart en bloedvaten. Daarom is het advies 1 keer per week vis te eten. Bij voorkeur vette vis, zoals makreel, haring, sardines of zalm.

> Mensen die een verhoogd risico lopen op hart- en vaatziekten of eerder een hartinfarct of beroerte hebben doorgemaakt, kunnen baat hebben bij meer vis. Omdat vooral vette vis ook schadelijke stoffen kan bevatten, is het wel verstandig daarbij te variëren.

eerlijk over eten
Voedingscentrum

Eet verstandig / suppleer verstandig





PARAMETER	LIMIT
peroxide value	5 meg/kg
anisidine value	20
TOTOX value	26

En meer van dit

(vooral dit)

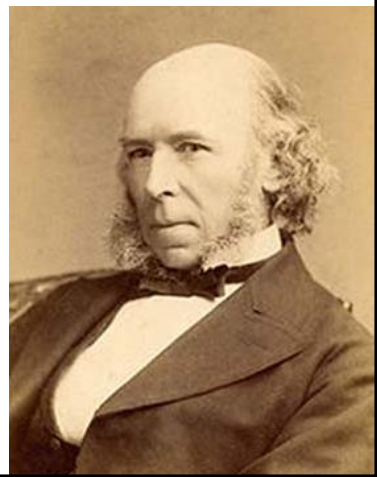
Dus: minder van dit

Linolzuurplas

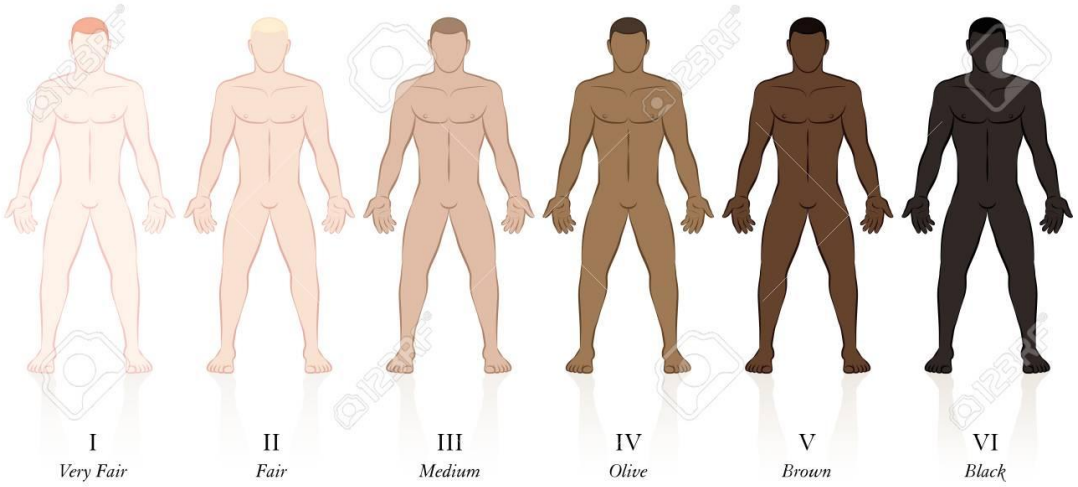
Take home message No. 4:

Vervang
omega-6 vetten (zonnebloemolie)
door omega-3 vet (vis)

en/of koop supplemenen van kwaliteit



Vitamine D


I
Very Fair
II
Fair
III
Medium
IV
Olive
V
Brown
VI
Black


Hijab
Meest gedragen hoofddoek
Chador
Lichaam bedekt, gezicht is zichtbaar
Nikab
Alleen de ogen zijn zichtbaar
Boerka
Volledige gezichts-bedekking
Foto's: ANP

De Vitamine D status in NL

- Advies Gezondheidsraad
  - 30 nmol/l for women under 50 and men under 70
  - 50 nmol/l for women over 50 and men over 70
- Institute of Medicine: 50 nmol/l

- Gemiddelde autochtone Nederlander 50-60 nmol/l
- Gemiddelde allochtone Nederlander 15-36 nmol/l

LITERATUUR
1 Grootjans-Geerts I. Hypovitaminose D: een versluierde diagnose. Ned Tijdschr Geneeskd 2001;145:2057-60.

Vitamin D in traditional people

25 Hadzabe

35 Maasai

Vitamin D in traditional people

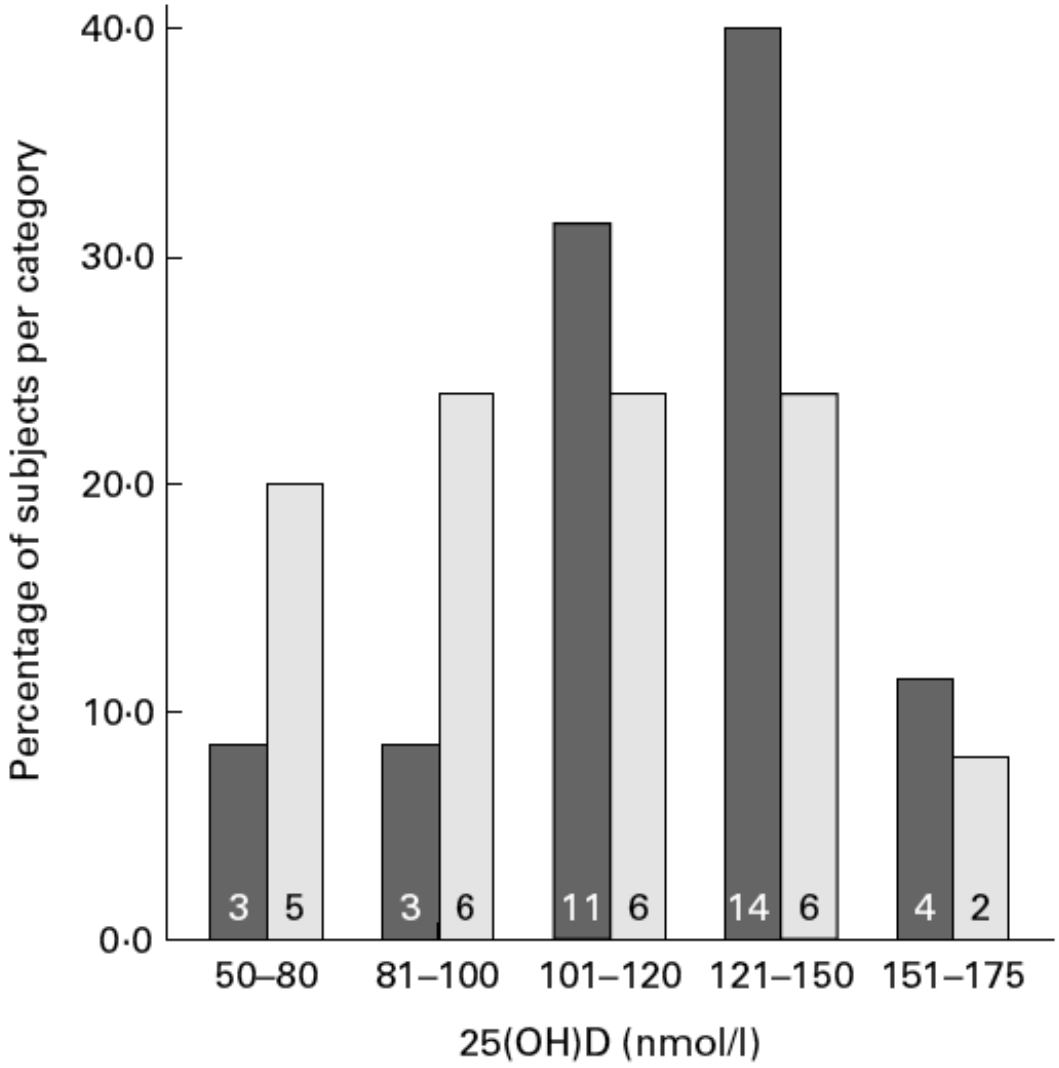
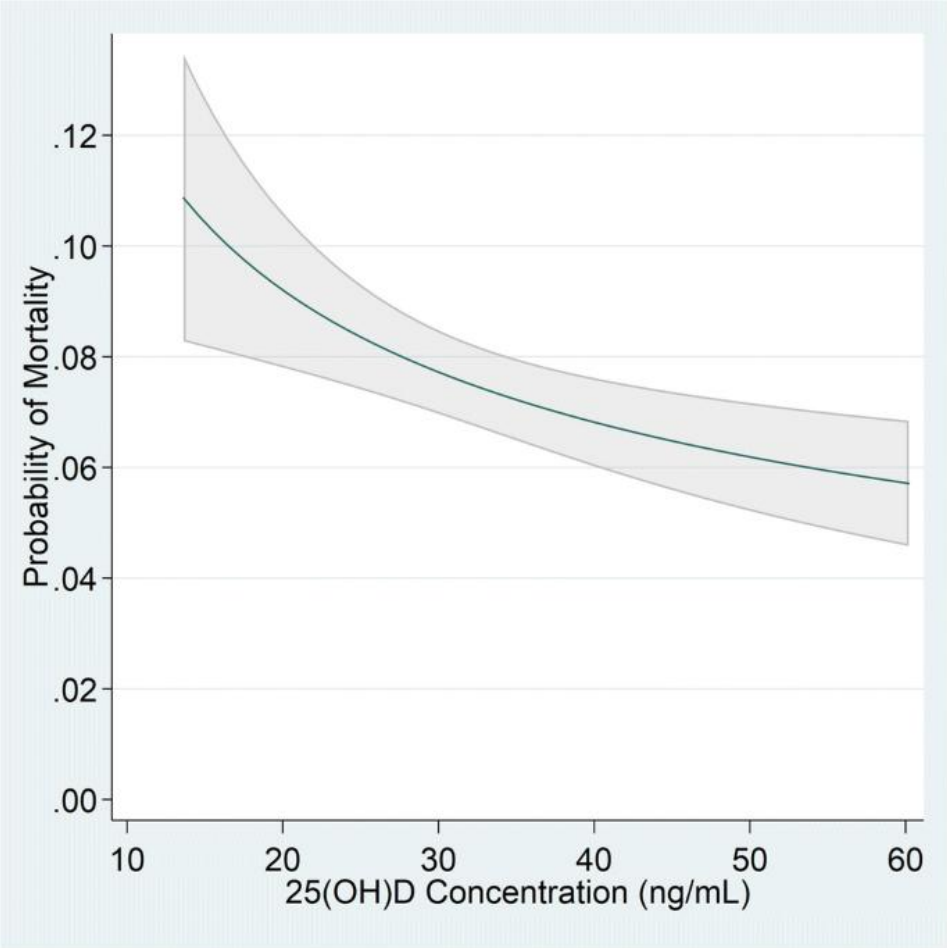


Fig. 1. Serum 25-hydroxyvitamin D (25(OH)D) frequency distributions for Maasai (■) and Hadzabe (□). The numbers in the bars refer to the absolute number of subjects.

- Mean serum 25(OH)D
  - Maasai 119 nmol/l
  - Hadzabe 109 nmol/l
  - Zero subjects under 50 nmol/l

Luxwolda et al, Brit J Nutr 2012

Vitamin D *status* and COVID mortality

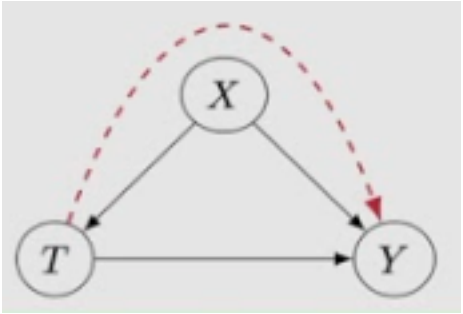


Association is not causation

Sleeping with shoes on is strongly correlated with waking up with a headache

Common cause: drinking the night before

1. Confounding



Interventies / RCTs

Meta-Analysis > Inflammopharmacology. 2024 Oct;32(5):3205-3212.
doi: 10.1007/s10787-024-01564-2. Epub 2024 Sep 3.

The impact of vitamin D administration on mortality in COVID-19 patients: a systematic review and meta-analysis of randomized controlled trials

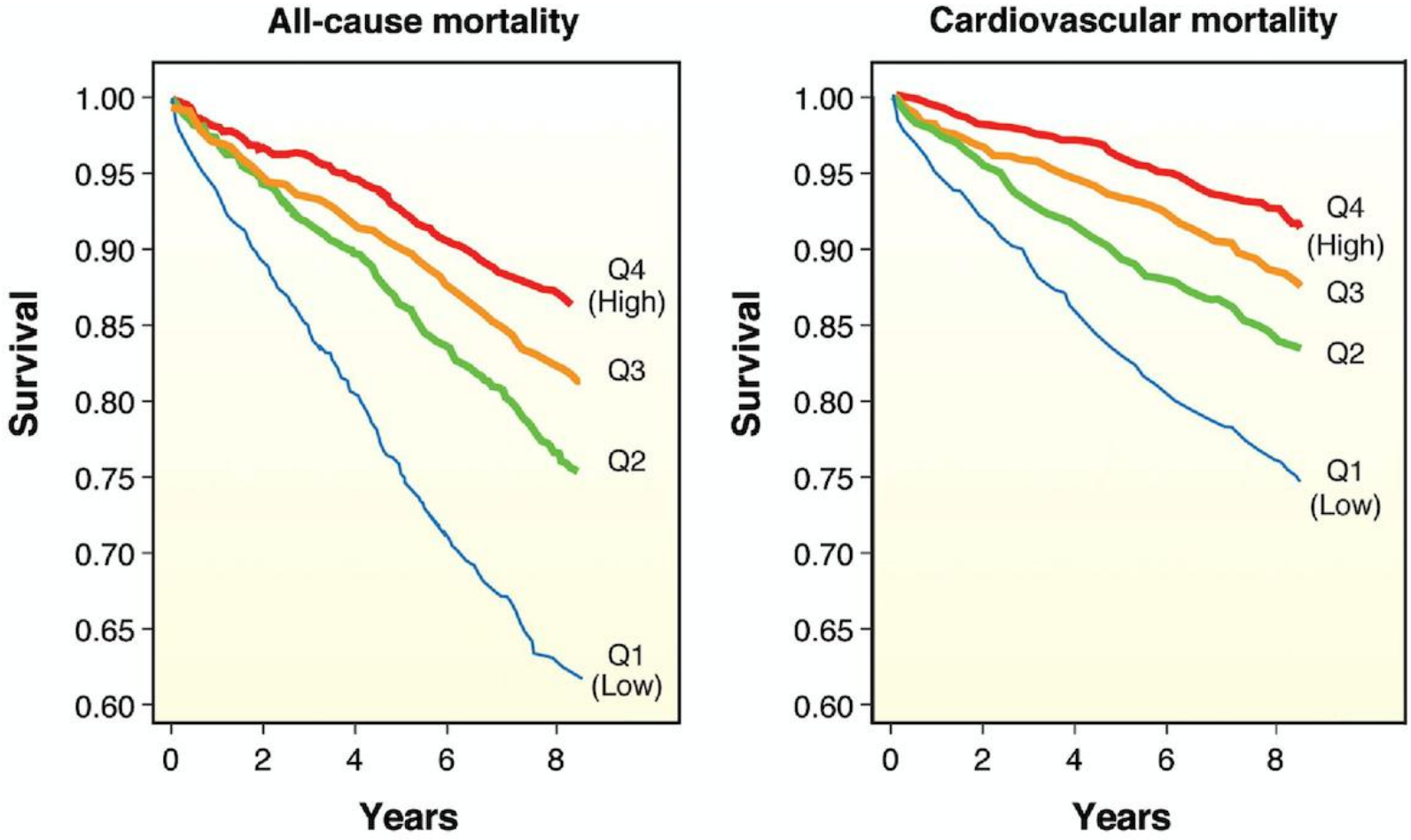
Results: Nineteen randomized controlled trials with 2495 participants were included. The meta-analysis showed a significant reduction in **all-cause mortality** with vitamin D supplementation (**pooled OR 0.72**, 95% CI 0.53-0.98; I^2 = 20%). Subgroup analysis for **severe COVID-19** cases also indicated significant mortality reduction (**pooled OR 0.57**, 95% CI 0.35-0.92; I^2 = 18%).

Meta-Analysis > Nutrients. 2024 May 7;16(10):1402. doi: 10.3390/nu16101402.

Effect of Vitamin D3 Supplementation on Severe COVID-19: A Meta-Analysis of Randomized Clinical Trials

Our meta-analysis showed a positive effect of vitamin D3 supplementation on **ICU admission (RR = 0.73;** 95% CI [0.57; 0.95], p = 0.02, I^2 = 19.6%) and **mortality associated with COVID-19** among patients (**RR = 0.56**; 95% CI [0.34; 0.91]; p = 0.02; I^2 = 0%).

Observationeel Vitamine D in HVZ



A) all-cause and **(B)** cardiovascular (CV) mortality in the 25-hydroxyvitamin D quartiles

Lavie et al. JACC. 2011 Oct, 58 (15) 1547–1556

Review > Curr Probl Cardiol. 2024 Jan;49(1 Pt C):102119. doi: 10.1016/j.cpcardiol.2023.102119.
Epub 2023 Oct 5.

Cardiovascular and Cerebrovascular Outcomes With Vitamin D Supplementation: A Systematic Review and Meta-Analysis

Our pooled analysis demonstrated **no significant difference** between vitamin D supplementation and placebo for the risk of **cardiovascular mortality** (**RR 1.01**, 95% CI 0.94-1.08; P = 0.80), **stroke or cerebrovascular events** (**RR 1.03**, 95% CI 0.95-1.11; P = 0.48), **myocardial infarction (MI)** (**RR 0.98**, 95% CI 0.91-1.06; P = 0.65), **cerebrovascular mortality** (**RR 1.00**, 95% CI 0.68-1.46; P = 0.99), **arrhythmias** (**RR 0.98**, 95% CI 0.66-1.44; P = 0.90) and hemorrhagic or ischemic stroke.

Vitamin D Supplementation and Cardiovascular Disease Risks in More Than 134000 Individuals in 29 Randomized Clinical Trials and 157000 Individuals in 30 Prospective Cohort Studies: An Updated Systematic Review and Meta-analysis

Review > J Res Health Sci. 2023 Dec 29;23(4):e00594. doi: 10.34172/jrhs.2023.129.

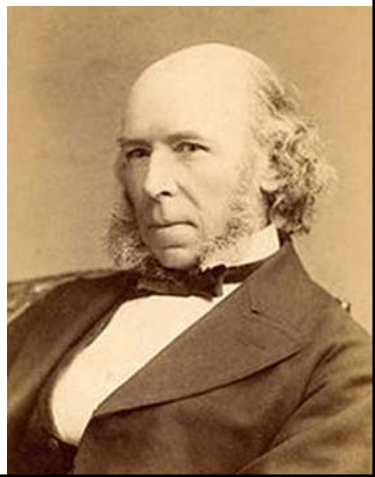
Results: In clinical trial studies, the **incidence of CVDs** **among the vitamin D-consuming group was not significantly different from that in the placebo group** (**RR: 0.99**, 95% CI: 0.95-1.03; *P*=0.77; I^2=0%). **CVD mortality** **was also not significantly different between the two groups** (**RR: 0.97**, 95% CI: 0.90-1.05; *P*=0.72; I^2=0%). In **cohort studies**, **low circulating 25 (OH) D increased the risk of CVD incidence by 31%** (**RR: 1.31**, 95% CI: 1.19-1.45) and **CVD mortality by 37%** (**RR: 1.37**, 95% CI: 1.17-1.61).

Take home message No. 5:

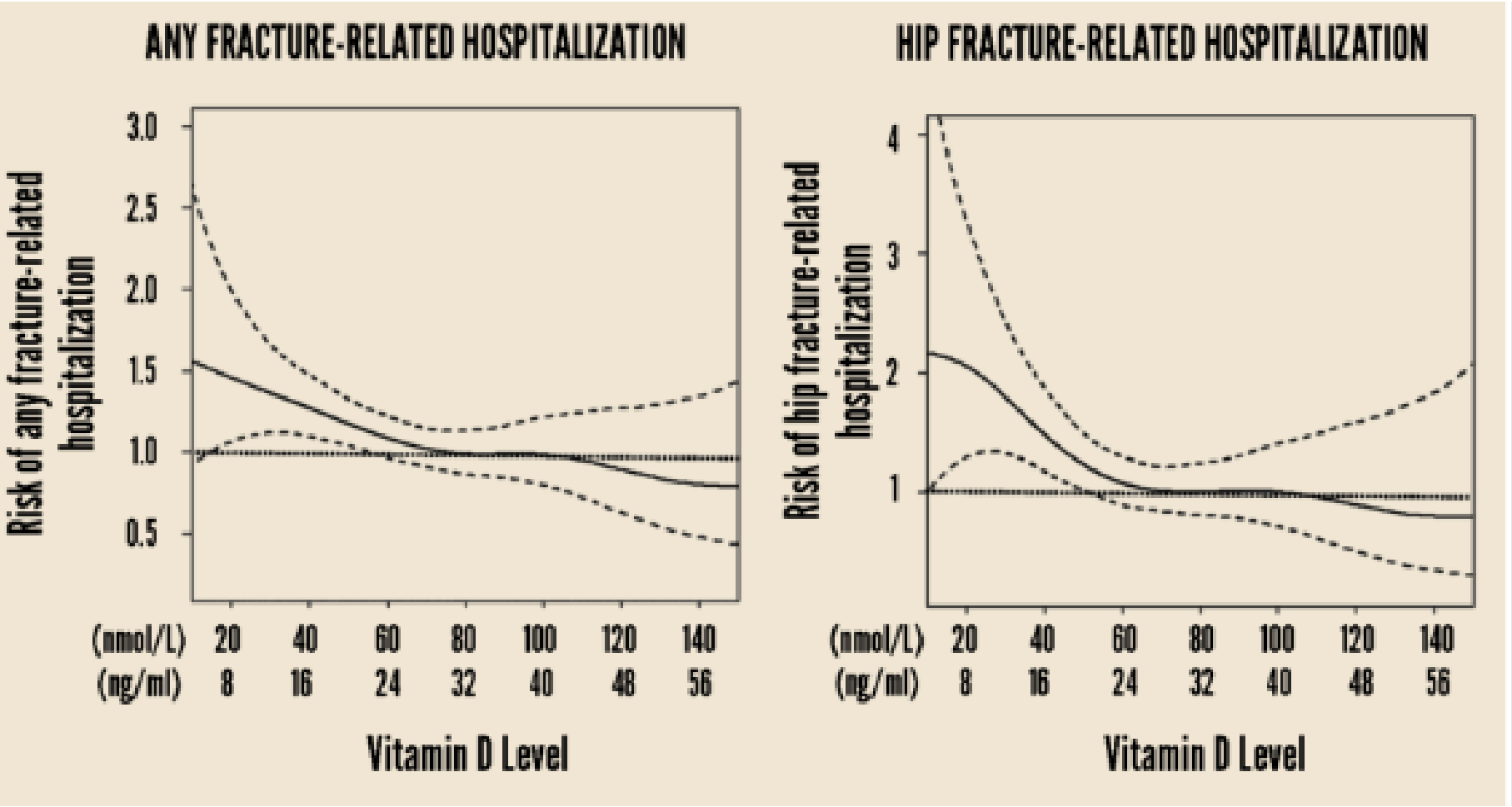
Vitamine D *suppletie*

beschermt niet tegen hart- en vaatziekten

maar vermindert wel de ernst van infectieziekten



Vitamine D and Bone Health



Zhu et al, JBMR 2019

Original Investigation | Public Health

Vitamin D and Calcium for the Prevention of Fracture
A Systematic Review and Meta-analysis

JAMA Network Open

Pang Yao, PhD; Derrick Bennett, PhD; Marion Mafham, MD; Xu Lin, MD, PhD; Zhengming Chen, DPhil; Jane Armitage, FRCP; Robert Clarke, FRCP, MD

Figure 2. Meta-analysis of Randomized Clinical Trials of Supplementation With Vitamin D Alone vs Placebo or No Treatment for Prevention of Any Fracture or of Hip Fracture

Hip fracture						
Sanders et al,[45] 2010	500 000 IU/y	19/1131	15/1127	High	1.22 (0.64-2.48)	4.7
Law et al,[41] 2006	100 000 IU/3 mo	24/1762	20/1955	High	1.28 (0.73-2.41)	6.1
Trivedi et al,[44] 2003	100 000 IU/4 mo	21/1345	24/1341	High	0.83 (0.48-1.57)	6.2
Grant et al,[47] 2005	800 IU/d	47/1343	41/1332	High	1.14 (0.75-1.75)	12.0
Meyer et al,[42] 2002	400 IU/d	50/569	47/575	High	1.08 (0.71-1.63)	12.6
Lips et al,[43] 1996	400 IU/d	58/1291	48/1287	High	1.15 (0.82-1.79)	14.4
Smith et al,[49] 2007	300 000 IU/y	66/4727	44/4713	High	1.42 (1.03-2.18)	15.4
Lyons et al,[48] 2007	100 000 IU/4 mo	112/1725	104/1715	High	1.06 (0.82-1.42)	28.6
All		397/13 893	343/14 045		1.14 (0.98-1.32)	100.0
Subtotal (Q = 3.0, *df* = 7, *P* = .89; I^2 = 0.0%)						

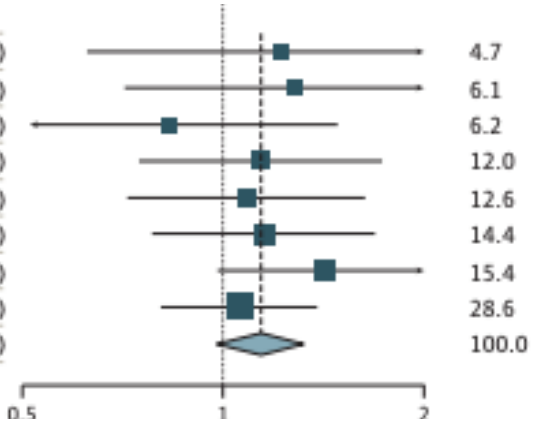
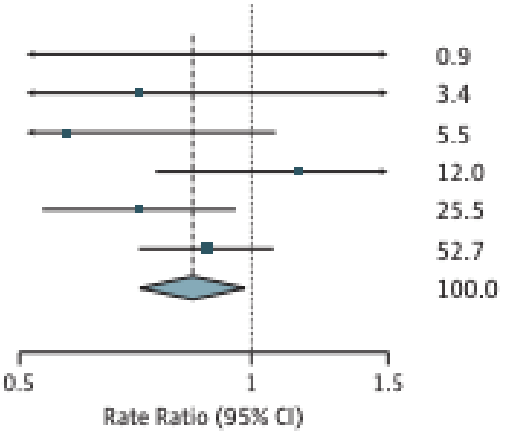
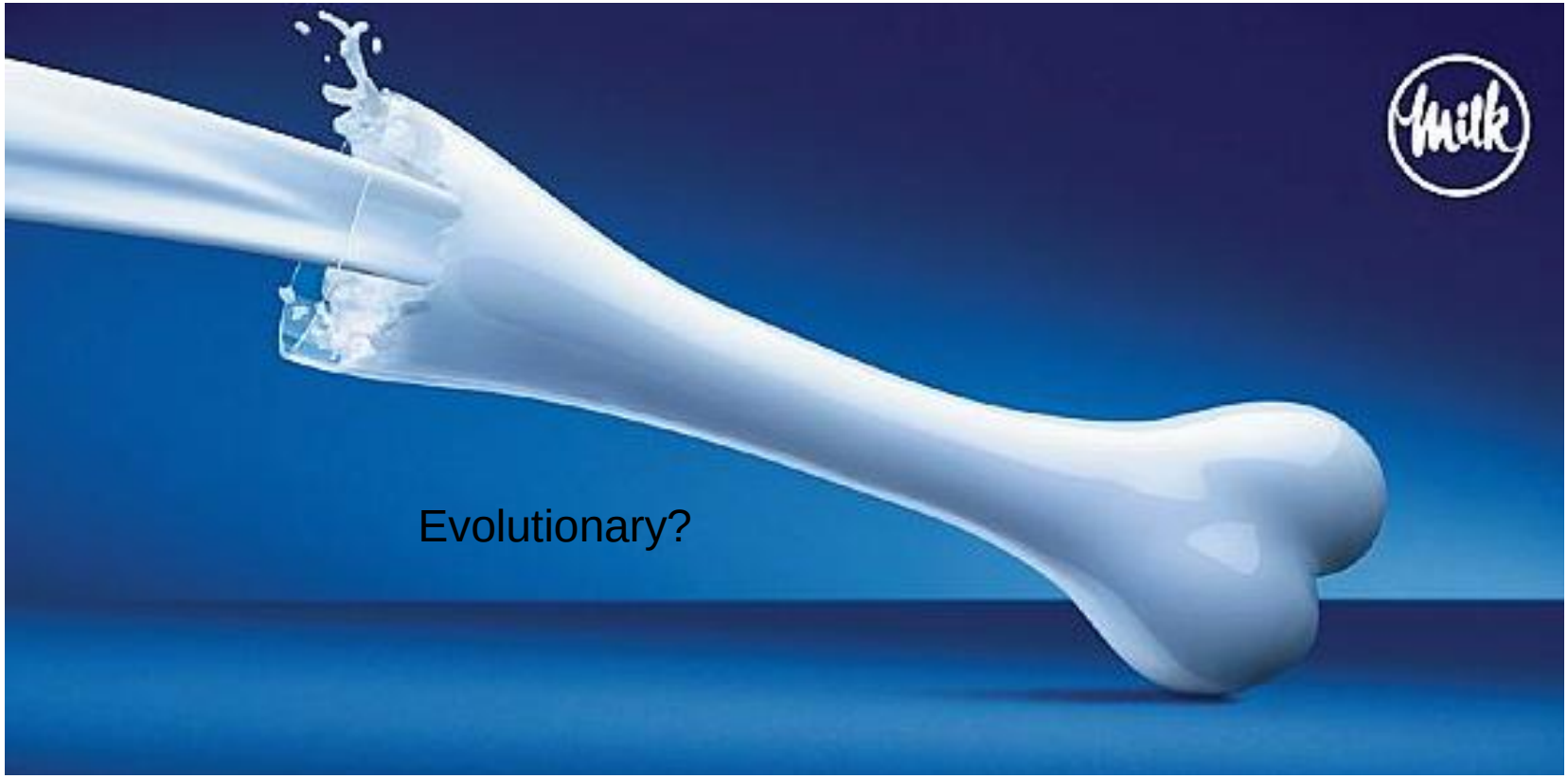


Figure 3. Meta-analysis of Randomized Clinical Trials of Supplementation With Calcium Plus Vitamin D vs Placebo or No Treatment for Prevention of Any Fracture or of Hip Fracture

Hip fracture							
Salovaara et al,[52] 2010	1000	800	4/1586	2/1609	High	1.98 (0.40-9.81)	0.9
Porthouse et al,[51] 2005	1000	800	8/1321	17/1993	High	0.72 (0.32-1.61)	3.4
Chapuy et al,[50] 2002	1200	800	27/393	21/190	High	0.58 (0.31-1.08)	5.5
Grant et al,[47] 2005	1000	800	46/1306	41/1332	High	1.15 (0.75-1.76)	12.0
Chapuy et al,[53] 1992	1200	800	80/1634	110/1636	High	0.72 (0.53-0.96)	25.5
Jackson et al,[54] 2006	1000	400	175/18 176	199/18 106	Low	0.87 (0.71-1.07)	52.7
All			340/24 416	390/24 866		0.84 (0.72-0.97)	100.0
Subtotal (Q = 6.0, *df* = 5, *P* = .31; I^2 = 16.5%)							



Calcium



- **NHG = huisartsen richtlijn:**
  - –adviseer > 1000 tot 1200 mg calcium/dag (circa 4 glazen melk(producten) of plakken kaas van 20 g)
  - –bij geen inname van zuivelproducten: 1000 mg
  - –extra calcium/dag in tabletvorm
  - –bij 1 tot 3 porties zuivelproducten/dag: 500 mg extra calcium/dag in tabletvorm

Effect of calcium supplements on risk of myocardial infarction and cardiovascular events: meta-analysis

BMJ 2010

Mark J Bolland, senior research fellow,[1] Alison Avenell, clinical senior lecturer,[2] John A Baron, professor,[3] Andrew Grey, associate professor,[1] Graeme S MacLennan, senior research fellow,[2] Greg D Gamble, research fellow,[1] Ian R Reid, professor[1]

- Het geven van calciumtabletten gedurende 5 jaar aan 1000 mensen leidde tot 26 *minder* gevallen van botbreuken

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- Het geven van calciumtabletten gedurende 5 jaar aan 1000 mensen leidde tot 24 *meer* gevallen van hartinfarcten.

Effect of calcium supplements on risk of myocardial infarction and cardiovascular events: meta-analysis

BMJ 2010

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- Het geven van calciumtabletten gedurende 5 jaar aan 1000 mensen leidde tot 26 *minder* gevallen van botbreuken
- Het geven van calciumtabletten gedurende 5 jaar aan 1000 mensen leidde tot 24 *meer* gevallen van hartinfarcten.
- Hierdoor overleden 13 mensen *meer* in de calciumgroep!

Critical Reviews in Food Science and Nutrition ›
Volume 62, 2022 - Issue 21

Total, dietary, and supplemental calcium intake and risk of all-cause cardiovascular, and cancer mortality: a systematic review and dose-response meta-analysis of prospective cohort studies

Sina Naghshi, Mohammad Naemi, Omid Sadeghi, Manije Darooghegi Mofrad, Mehrasa Moezrad & **Leila Azadbakht**

Dietary calcium intake was associated with a lower risk of all-cause mortality (Pooled ES for highest v lowest category: 0.95; 95% CI: 0.92–0.99, I^2=62.1%, P < 0.001). **Supplemental calcium intake was not significantly associated with risk of all-cause, CVD and cancer mortality.**

J Intern Med. 2023 Jul;294(1):83-95. doi: 10.1111/joim.13643. Epub 2023 Apr 24.

All-cause and cause-specific mortality risks associated with calcium supplementation with or without vitamin D: A nationwide population-based study

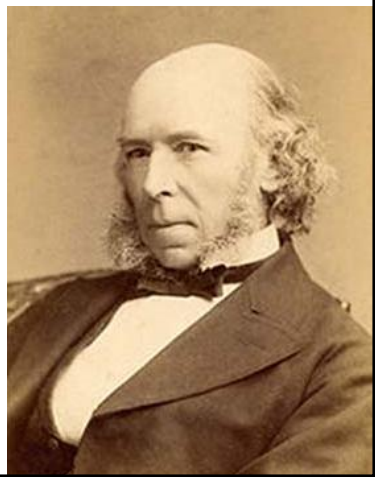
calcium supplementation only [CaO], n = 6256; calcium supplementation in combination with vitamin D [CaD], n = 21,590)

Kyoung Jin Kim [1], Jimi Choi [1], Kyeong Jin Kim [1], Nam Hoon Kim [1], Sin Gon Kim [1]

Results: No difference in all-cause mortality risk was found between the Ca-Only and control groups: (adjusted hazard ratio [HR] = 1.00; 95% confidence interval [CI]: 0.92-1.10). However, **all-cause mortality was lower in the CaD group (HR = 0.85**; 95% CI: 0.80-0.89) compared with that in the control group.

Take home message No. 6:

Haal calcium bij voorkeur uit je voeding
en combineer in geval van suppletie met vitamine D



Calcium sources

1 cup cooked leafy greens = 200-350mg

1 cup beans = 120-180mg

1 tbs sesame seeds = 90mg

20 almonds = 60mg

1 orange = 70mg

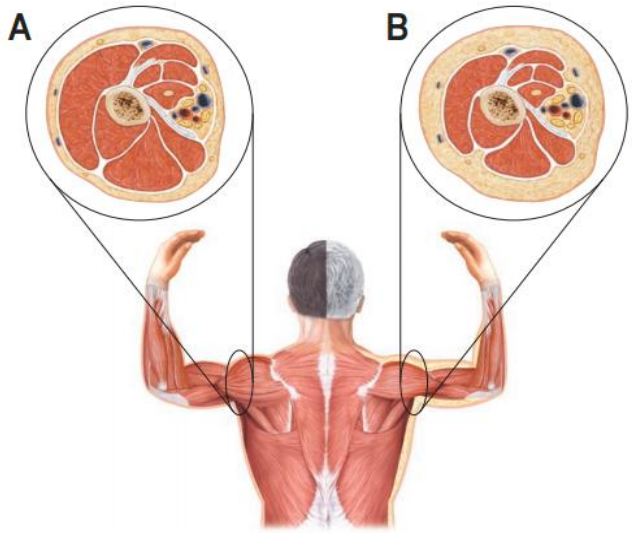
2 tbsp chia seeds = 200mg.

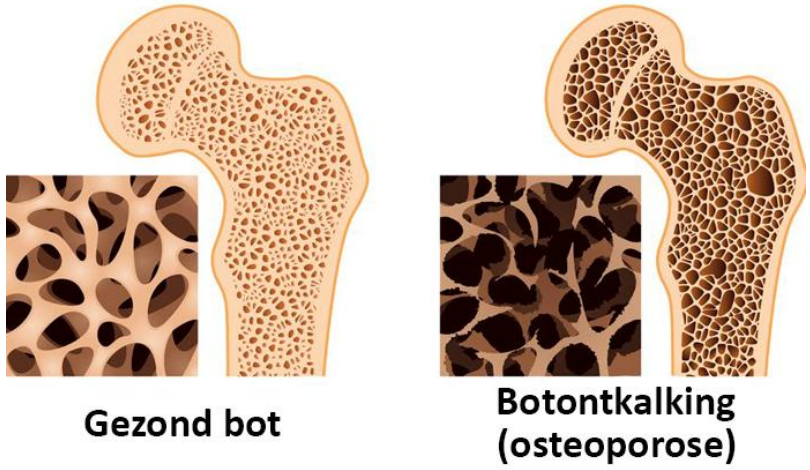
8 sardines = 370mg

6 brazil nuts = 40mg

Use it or lose it!

(osteoporose)





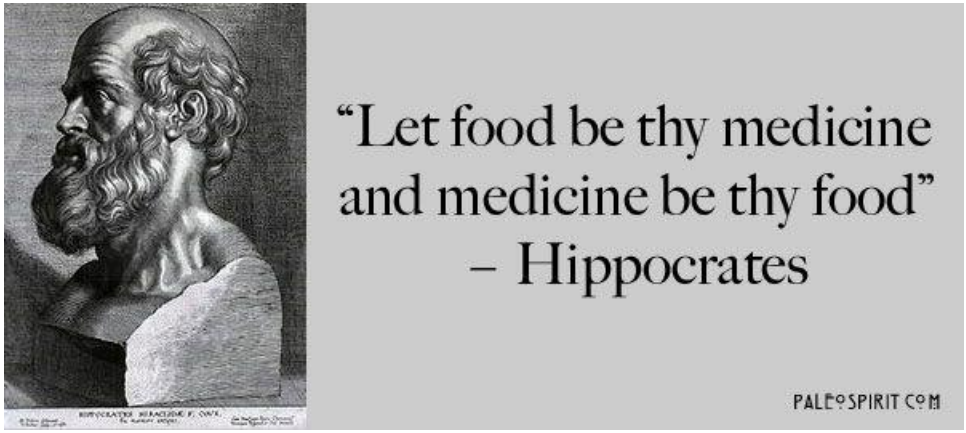
Impact of magnesium on bone health in older adults: A systematic review and meta-analysis

Bone 154 (2022) 116233

Inge Groenendijk [a,*], Marieke van Delft [a], Pieter Versloot [a], Luc J.C. van Loon [b], Lisette C.P.G. M. de Groot [a]

Results: Once 787 records were screened, six cohort studies, one case-control study and five cross-sectional studies were included. Qualitative evaluation demonstrated a positive trend between higher magnesium intake and higher hip and femoral neck BMD. Meta-analysis of four studies showed a significant positive association between magnesium intake and hip BMD (pooled beta: 0.03, 95% CI: 0.01–0.06, $p < 0.05$).

Conclusions: This systematic review indicates that a higher magnesium intake may support an increase in hip and femoral neck BMD. Due to limited research no associations with BMD at other sites or fractures were found. There is a need for properly designed cohort studies to determine the association between magnesium intake and bone health in older adults. Next, large and long-term randomized controlled trials in older adults are needed to determine whether an increase in magnesium (supplementation) intake can improve bone health. The combination of several bone nutrients (calcium, vitamin D, protein, magnesium and potentially more) may be needed for the most optimal effect on bone health and to delay or prevent the development of osteoporosis.



Uit de oude doos…

IMPROVED MINERAL BALANCE AND SKELETAL METABOLISM IN POSTMENOPAUSAL WOMEN TREATED WITH POTASSIUM BICARBONATE

ANTHONY SEBASTIAN, M.D., STEVEN T. HARRIS, M.D., JOAN H. OTTAWAY, M.A., KAREN M. TODD, M.S., R.D., AND R. CURTIS MORRIS, JR., M.D.

Abstract *Background.* In normal subjects, a low level of metabolic acidosis and positive acid balance (the production of more acid than is excreted) are typically present and correlate in degree with the amount of endogenous acid produced by the metabolism of foods in ordinary diets abundant in protein. Over a lifetime, the counteraction of retained endogenous acid by base mobilized from the skeleton may contribute to the decrease in bone mass that occurs normally with aging.

Methods. To test that possibility, we administered potassium bicarbonate to 18 postmenopausal women who were given a constant diet (652 mg [16 mmol] of calcium and 96 g of protein per 60 kg of body weight). The potassium bicarbonate was given orally for 18 days in doses (60 to 120 mmol per day) that nearly completely neutralized the endogenous acid.

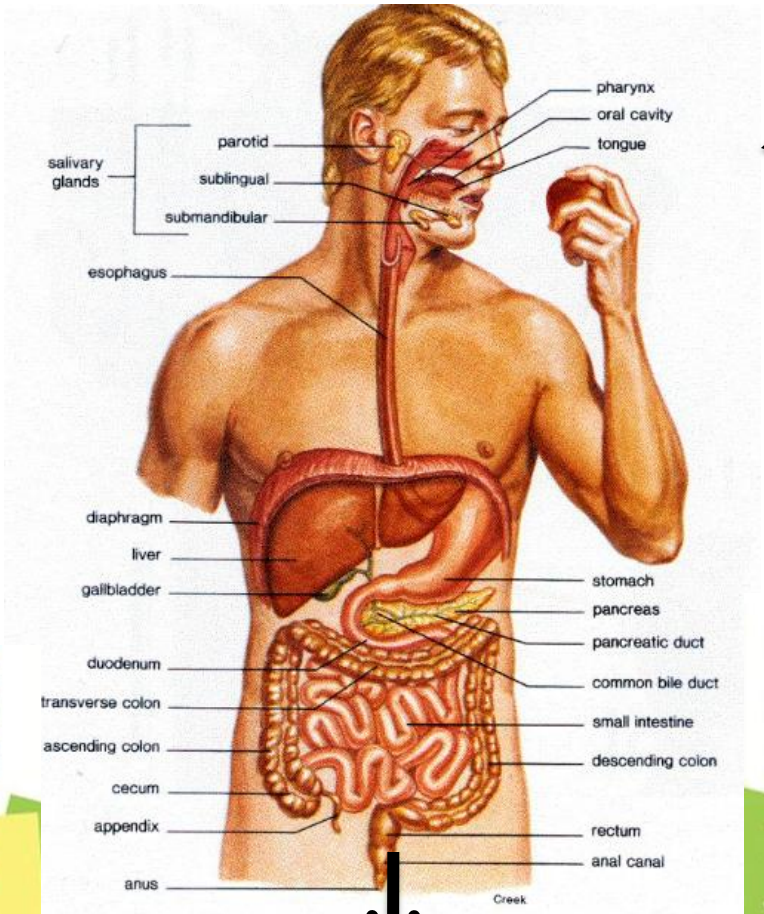
Results. During the administration of potassium bicarbonate, the calcium and phosphorus balance became less negative or more positive — that is, less was excreted in comparision with the amount ingested (mean [±SD] change in calcium balance, +56±76 mg [1.4±1.9 mmol] per day per 60 kg; P = 0.009; change in phosphorus balance, +47±64 mg [1.5±2.1 mmol] per day per 60 kg; P = 0.007) because of reductions in urinary calcium and phosphorus excretion. The changes in calcium and phosphorus balance were positively correlated (P<0.001). Serum osteocalcin concentrations increased from 5.5±2.8 to 6.1±2.8 ng per milliliter (P<0.001), and urinary hydroxyproline excretion decreased from 28.9±12.3 to 26.7±10.8 mg per day (220±94 to 204±82 μmol per day; P = 0.05). Net renal acid excretion decreased from 70.9±10.1 to 12.8±21.8 mmol per day, indicating nearly complete neutralization of endogenous acid.

Conclusions. In postmenopausal women, the oral administration of potassium bicarbonate at a dose sufficient to neutralize endogenous acid improves calcium and phosphorus balance, reduces bone resorption, and increases the rate of bone formation. (N Engl J Med 1994; 330:1776-81.)

Calcium

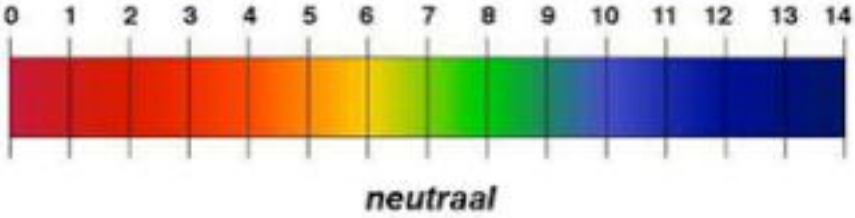
Magnesium

Carbonate



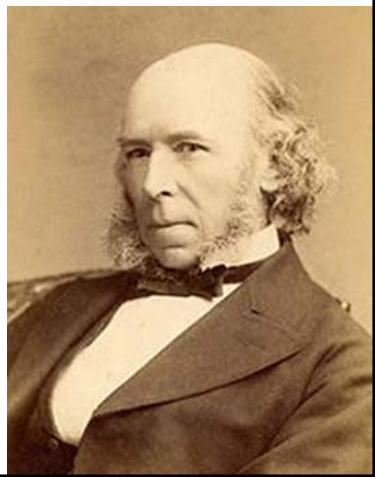
pH schaal

zuur **basisch**

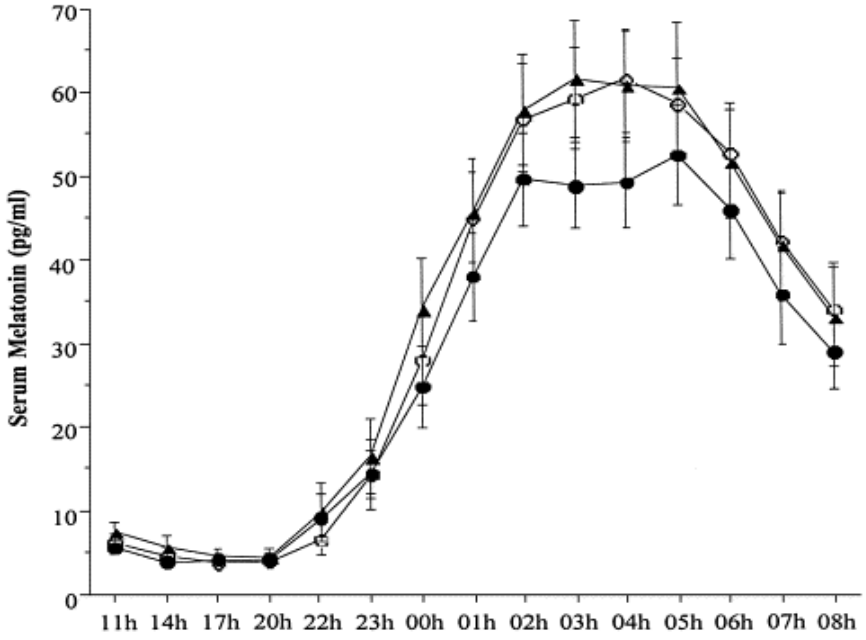


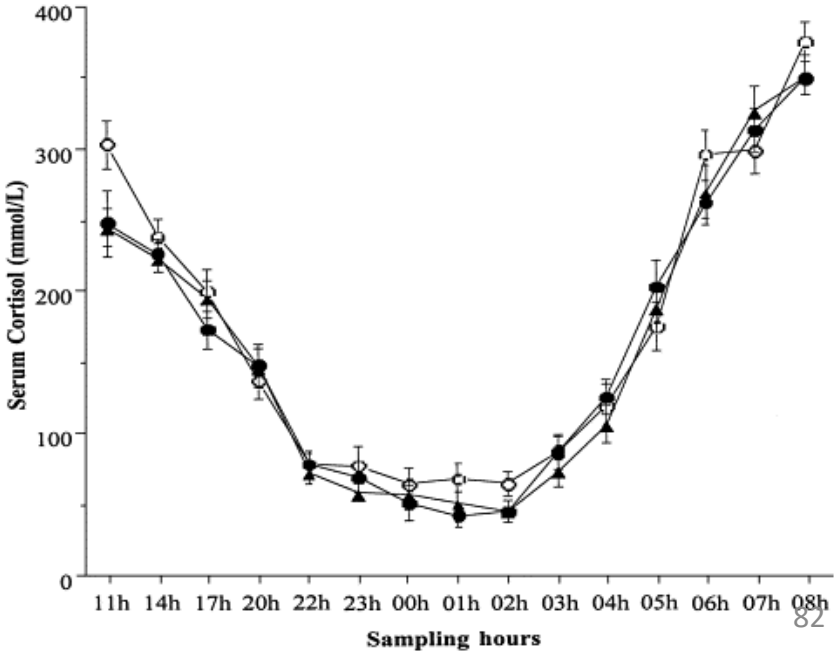
Take home message No. 7:

Haal mineralen bij voorkeur uit je voeding
en houd ze vast (in je nieren) door de juiste zuurgraad

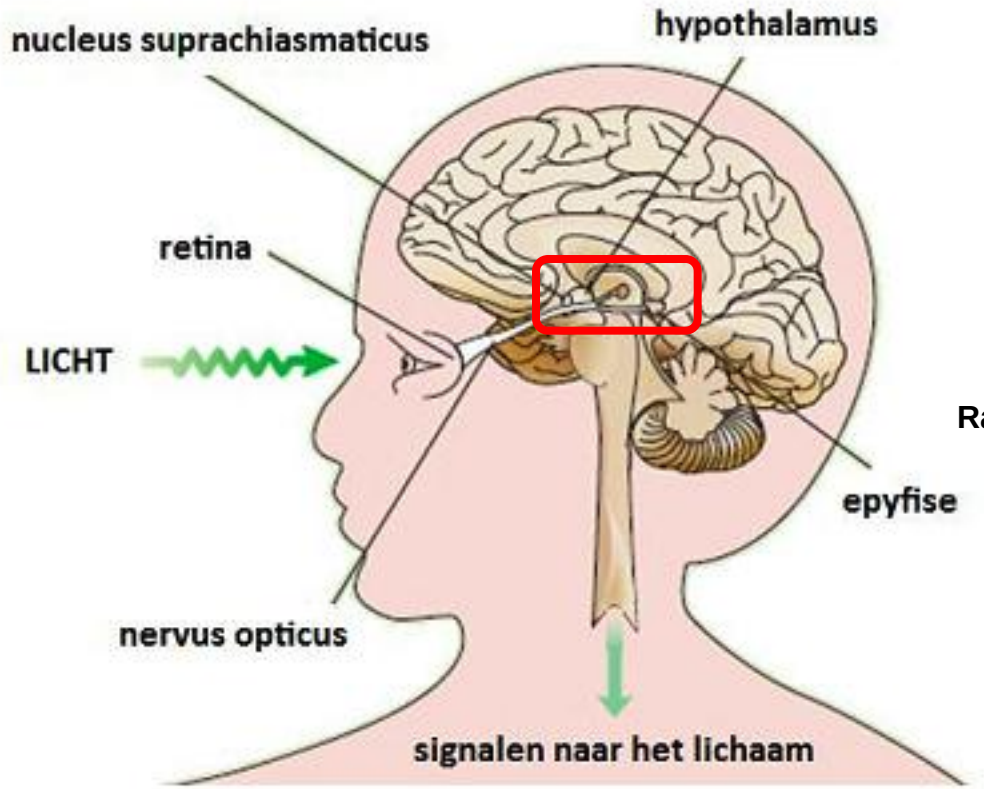


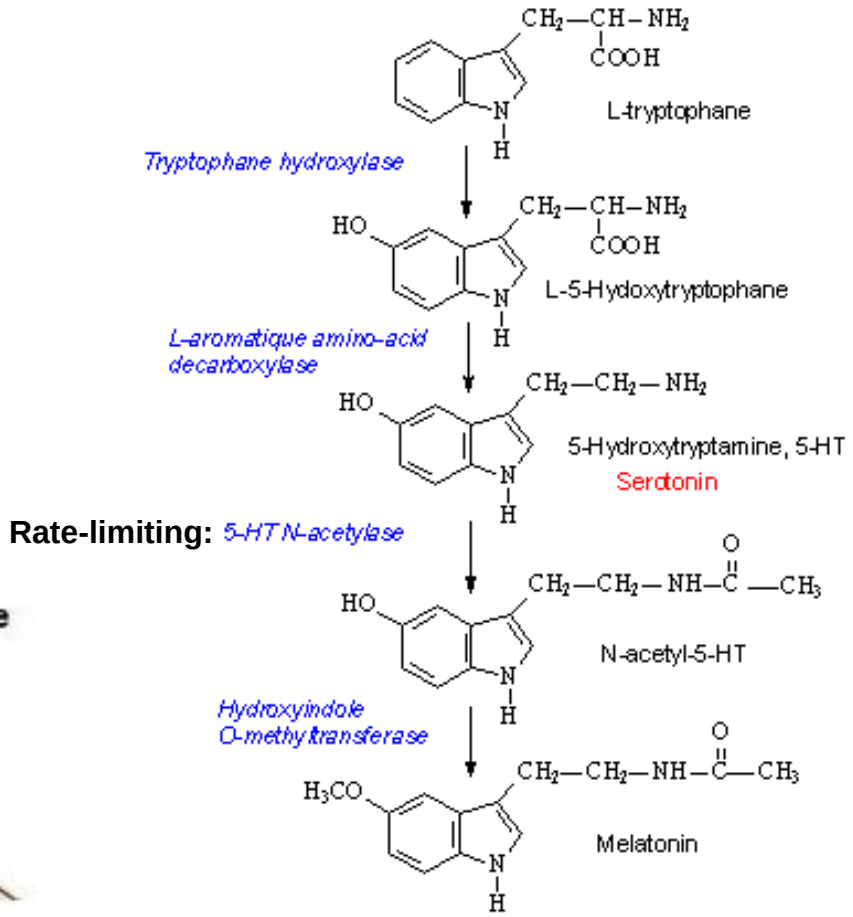
Circadiaan ritme / melatonine





Melatonine en het circadiaan ritme



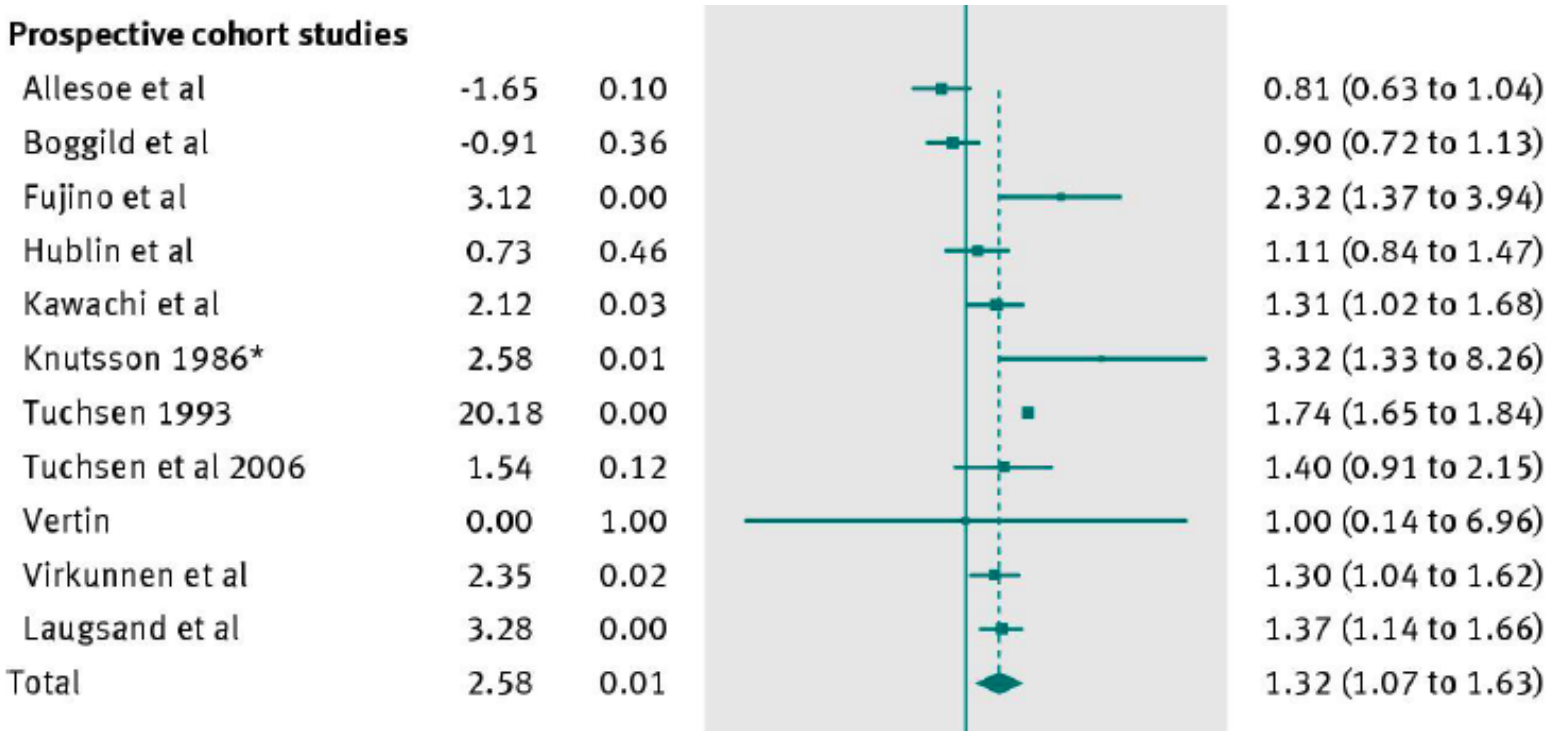


pijnappelklier of epifyse – het derde oog

Observational data

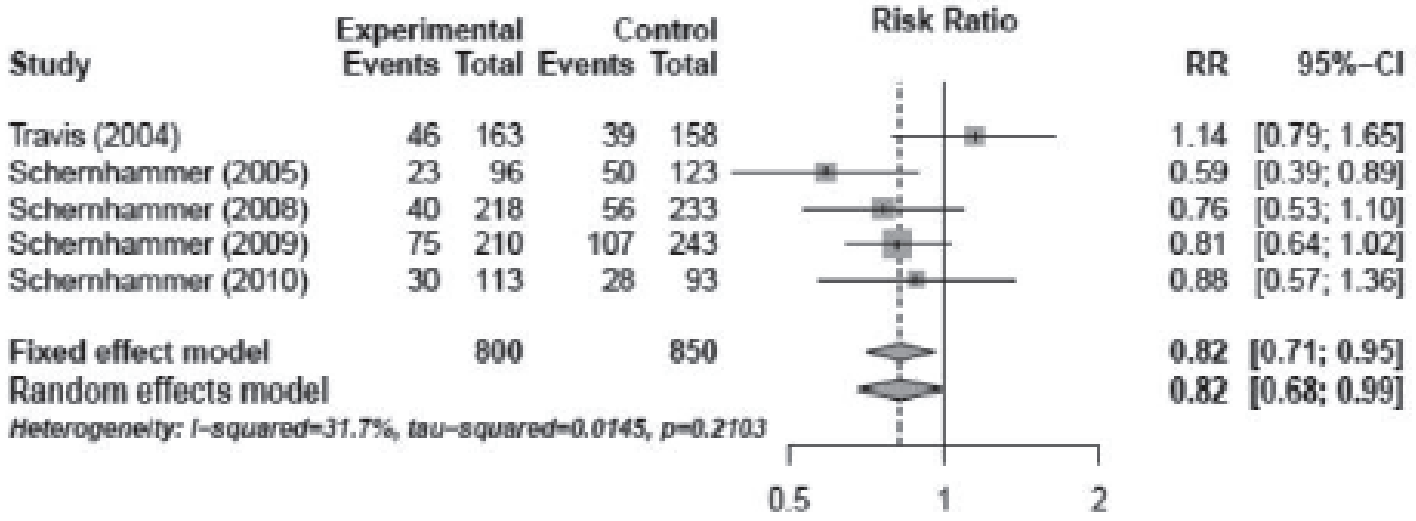
Shift work and vascular events: systematic review and meta-analysis

BMJ 2012;345:e4800 doi: 10.1136/bmj.e4800 (Published 26 July 2012)



Urinary Excretion of Melatonin and Association with Breast Cancer: Meta-Analysis and Review of the Literature

Michelle Basler[a,b] Alexander Jetter[a] Daniel Fink[b] Burkhardt Seifert[c]
Gerd A. Kullak-Ublick[a] Andreas Trojan[a,d]



Results: Statistical analysis of data from 5 prospective case-control studies indicates an inverse association between BC risk and the highest levels of urinary aMT6s.

Breast Care 2014;9:182–187

Cancer Chemother Pharmacol (2012) 69:1213–1220
DOI 10.1007/s00280-012-1828-8

Interventional data

ORIGINAL ARTICLE

The efficacy and safety of melatonin in concurrent chemotherapy or radiotherapy for solid tumors: a meta-analysis of randomized controlled trials

Melatonin significantly improved the complete and partial remission (16.5 vs. 32.6%, *P<0.000*) as well as 1-year survival rate (28.4 vs. 52.2%; *P = 0.001)*

Melatonin decreased radiochemotherapy-related side effects including
- Thrombocytopenia (19.7 vs. 2.2%; *P < 0.00001)*
- Neurotoxicity *(15.2 vs. 2.5%*; *P < 0.0001), and*
- Fatigue *(49.1 vs.*17.2%; *P < 0.00001).*

Effects were consistent across different types of cancer.

Melatonin supplementation improves N-terminal pro-B-type natriuretic peptide levels and quality of life in patients with heart failure with reduced ejection fraction: Results from MeHR trial, a randomized clinical trial

Results: Overall, 92 patients were recruited, and 85 completed the study (melatonin: 42, placebo: 43). Serum NT-Pro BNP decreased significantly in the melatonin compared with the placebo group (estimated marginal means for difference [95% confidence interval]: 111.0 [6.2–215.7], $p = .044$). Moreover, the melatonin group had a significantly better clinical outcome (0.93 [0.18–1.69], $p = .017$), quality of life (5.8 [0.9–12.5], $p = .037$), and New York Heart Association class (odds ratio: 12.9 [1.6–102.4]; $p = .015$) at the end of the trial. Other studied outcomes were not significantly different between groups.

Clin Cardiol. 2022;45:417–426.

Melatonin supplementation improves N-terminal pro-B-type natriuretic peptide levels and quality of life in patients with heart failure with reduced ejection fraction: Results from MeHR trial, a randomized clinical trial

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Haemodynamic-guided management of heart failure (GUIDE-HF): a randomised controlled trial

Lancet 2021; 398: 991–1001

Interpretation Haemodynamic-guided management of heart failure did not result in a lower composite endpoint rate of mortality and total heart failure events compared with the control group in the overall study analysis. However, a

Remote haemodynamic monitoring of pulmonary artery pressures in patients with chronic heart failure (MONITOR-HF): a randomised clinical trial

Jasper J Brugts, MD [a,*] · Sumant P Radhoe, MD [a,*] · Pascal R D Clephas, MSc [a,†] · Dilan Aydin, MD [a,†] · Marco W F van Gent, MD [b] · Mariusz K Szymanski, MD [c] · et al. Show more

The Lancet, ISSN: 0140-6736, Vol: 401, Issue: 10394, Page: 2113-2123

The difference in mean change in KCCQ overall summary score at 12 months was 7·13 (95% CI 1·51–12·75; p=0·013) between groups (+7·05 in the CardioMEMS group, p=0·0014, and –0·08 in the standard care group, p=0·97).

Brugts et al, Lancet, 2023

Melatonin as an Anti-Aging Therapy for Age-Related Cardiovascular and Neurodegenerative Diseases

Frontiers in Aging Neuroscience

June 2022 | Volume 14 | Article 888292

Virna Margarita Martín Giménez[1], *Natalia de las Heras*[2], *Vicente Lahera*[2], *Jesús A. F. Tresguerres*[2], *Russel J. Reiter*[3] *and Walter Manucha*[4,5]*

Review

Chronic Administration of Melatonin: Physiological and Clinical Considerations

Donald Givler [1], Amy Givler [1], Patrick M. Luther [2], Danielle M. Wenger [3], Shahab Ahmadzadeh [4], Sahar Shekoohi [4,*], Amber N. Edinoff [5], Bradley K. Dorius [4], Carlo Jean Baptiste [4], Elyse M. Cornett [4], Adam M. Kaye [6] and Alan D. Kaye [4]

Conclusion: Melatonin at low to moderate dosages (approximately 5–6 mg daily or less) appears safe. Studies investigating potential benefits in reducing cognitive decline and increased longevity are ongoing. However, it is widely agreed that the long-term effects of taking exogenous melatonin have been insufficiently studied and warrant additional investigation.

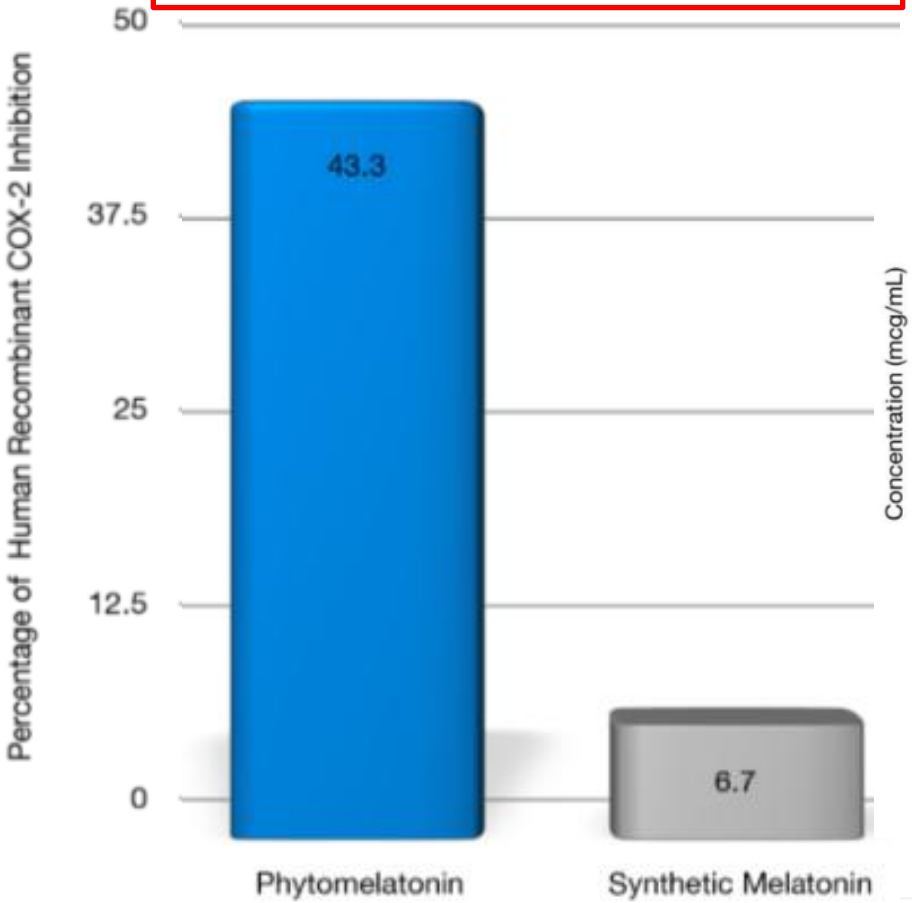
Neurol. Int. **2023**, *15*, 518–533.

Review

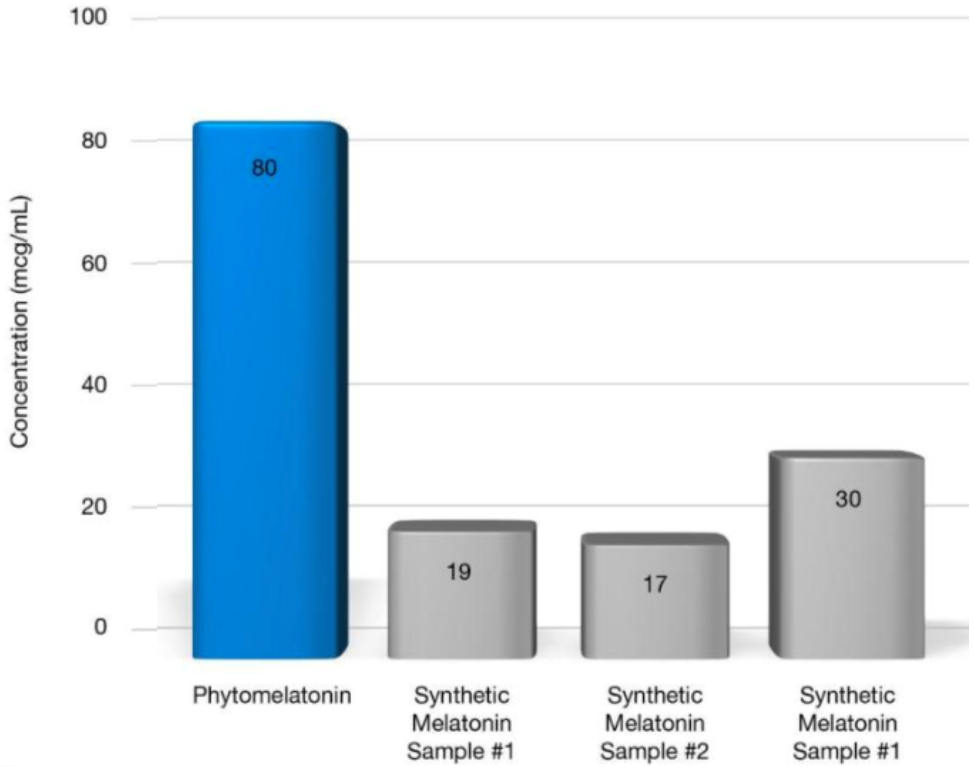
Is Melatonin the "Next Vitamin D"?: A Review of Emerging Science, Clinical Uses, Safety, and Dietary Supplements

Deanna M. Minich [1,*], Melanie Henning [2], Catherine Darley [3], Mona Fahoum [4], Corey B. Schuler [5,6] and James Frame [7,8]

Inhibition of inflammation by phytomelatonin



Free Radical Scavenging Percentage (DPPH%)



Nutrients **2022**, *14*, 3934. https://doi.org/10.3390/nu14193934

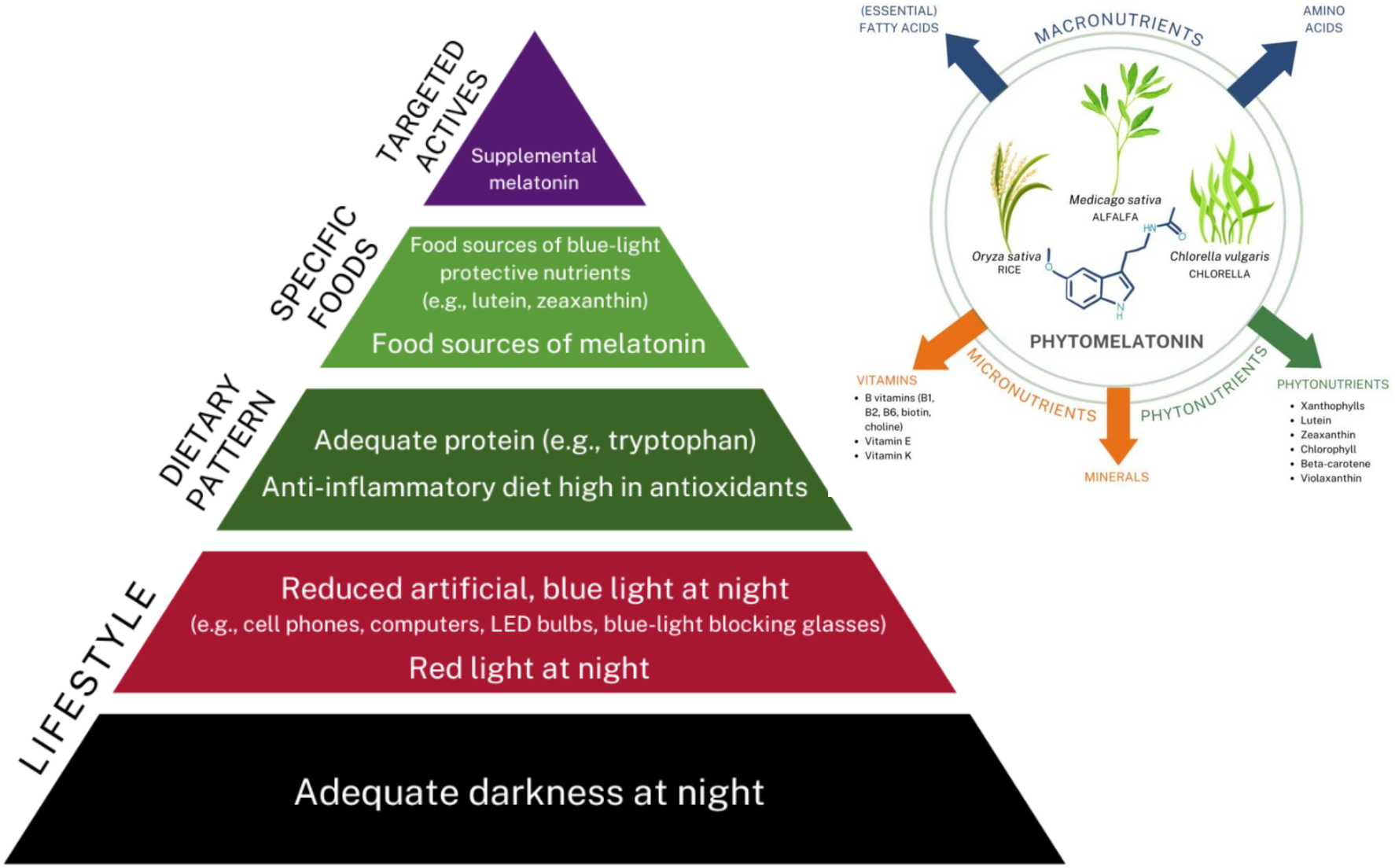
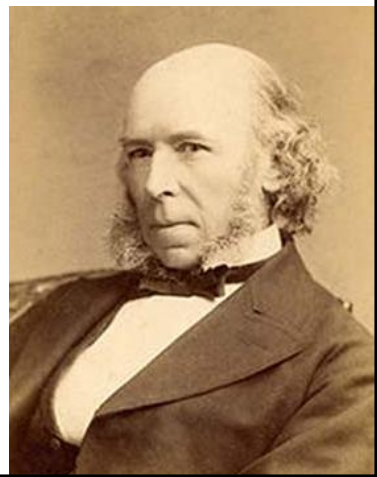


Figure 10. A comprehensive nutrition and lifestyle approach to optimizing melatonin. There are several as-pects to ensuring healthy melatonin levels, including lifestyle modifications involving light expo-sure, selecting specific dietary patterns and foods, and, when required, targeted supplemental sources. Graphic created using Canva.com, accessed 27 July 2022.

Take home message No. 8:

Prioriteer slaap,

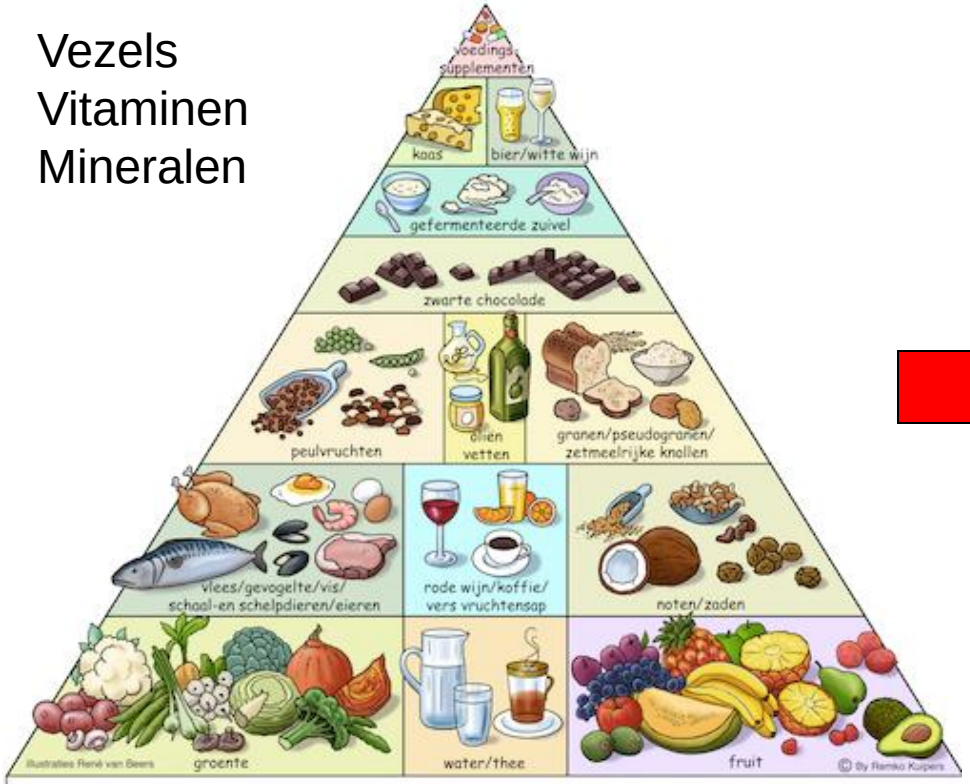
maar mogelijk is (phyto)melatonine in suprafysiologische doseringen anti-inflammatoir…



Micronutrienten vervolgd

Micronutriënten = voeden → **Energie = vullen**

Vezels
Vitaminen
Mineralen



OERVOEDSELPIRAMIDE

Koolhydraten
Eiwitten
Vetten

MODERN DIEET

OER → **Modern**

Tabel 6: Micronutriënten in het oerdieet en onze huidige voeding.

Vitaminen	Oerdieet	Huidige voeding	ADH	UL
Energie (kcal)	2.500			
Vitamine A (RAE)	2400	770	700-1000	3000
Beta-caroteen (µg)	3583	99		
Vit. B1, thiamine (mg)	1,9	1,3	1.1-1.5	ND
Vit. B2; riboflavine (mg)	2,7	1,7	1.5-1.7	ND
Vit. B3,; nicotinezuur (mg)	56,2	13	17-20	35
Vit. B5; panthotheenzuur (mg)	11,5	2,0	5-10	ND
Vit. B6; pyridoxine (mg)	5,9	2,2	1.5-2.0	100
Vit. B8; biotine (µg)	113	13	30-50	ND
Vit. B9 of B11; folaat (µg)	911	272	300-400	1000
Vit. B12; cobalamine (µg)	10,3	4,8	6.0	ND
Vitamine C (mg)	559	96	60-90	2000
Vitamine D (µg, per os)	-	3,5	2.5-15	100
Vitamine D (IU, cutaan)	4000	-	400	4000
Vitamine E (mg)	22,6	15,1	11.8-15	300
Vitamine K (µg)	945	59	90-120	ND
Mineralen				
Natrium (mg)	546	2943	1500-2400	2400
Kalium (mg)	6333	3676	4700	ND
Calcium (mg)	972	1080	1000-1300	2000
Fosfor (mg)	2289	1735	700-1400	4000
Magnesium (mg)	742	371	300-400	ND
IJzer (mg)	33,1	11,4	9-18	45
Zink (mg)	14,2	11,7	10-15	40
Koper (mg)	6	1,3	1.5-3.5	10
Mangaan (mg)	7,3	0,9	2	11
Selenium (µg)	147	51	50-150	400
Vezels (g)	47	8	25-38	ND

ADH: aanbevolen dagelijkse hoeveelheid;

Bron: Kuipers, Oerdieet

Wat eten mensen gemiddeld?

Tabel 18: Percentage Westerlingen dat aan ADH voldoet

Nutriënt	Aanbeveling	Percentage
Natrium	2400 mg	100
Selenium	70 ug	91
Riboflavine / B2	1.7 mg	89
IJzer	18 mg	89
Niacine / B3	20 mg	87
Fosfor	1000 mg	87
Koper	2 mg	84
Thiamine / B1	1.5 mg	82
Vitamine B12	6 ug	80
Pyridoxine / B6	2 mg	74
Zink	15 mg	71
Foliumzuur	400 ug	60
Vitamine C	60 mg	51
Vitamine A	900 ug	46
Magnesium	400 mg	43
Vitamine E	30 IU	14
Jodium	150 ug	<10*
Kalium	4700 mg	8

* Indien het gebruik van gejodeerd zout (o.a. in brood) niet wordt meegerekend

Bron: Kuipers, Oerdieet

Wat eten mensen gemiddeld?

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Pyridoxine / B6	2 mg	74
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Foliumzuur	400 ug	60
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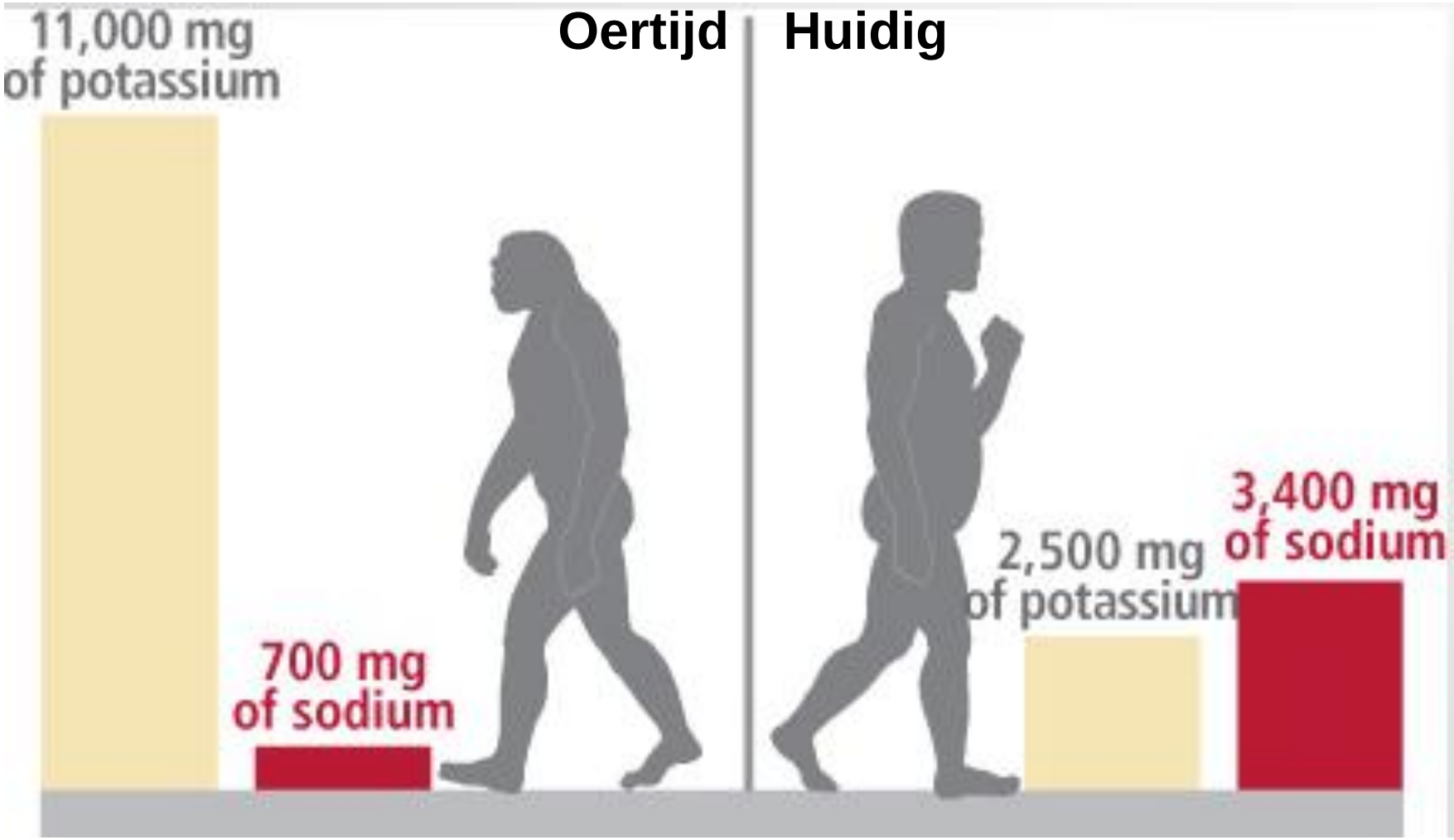
* Indien het gebruik van gejodeerd zout (o.a. in brood) niet wordt meegerekend

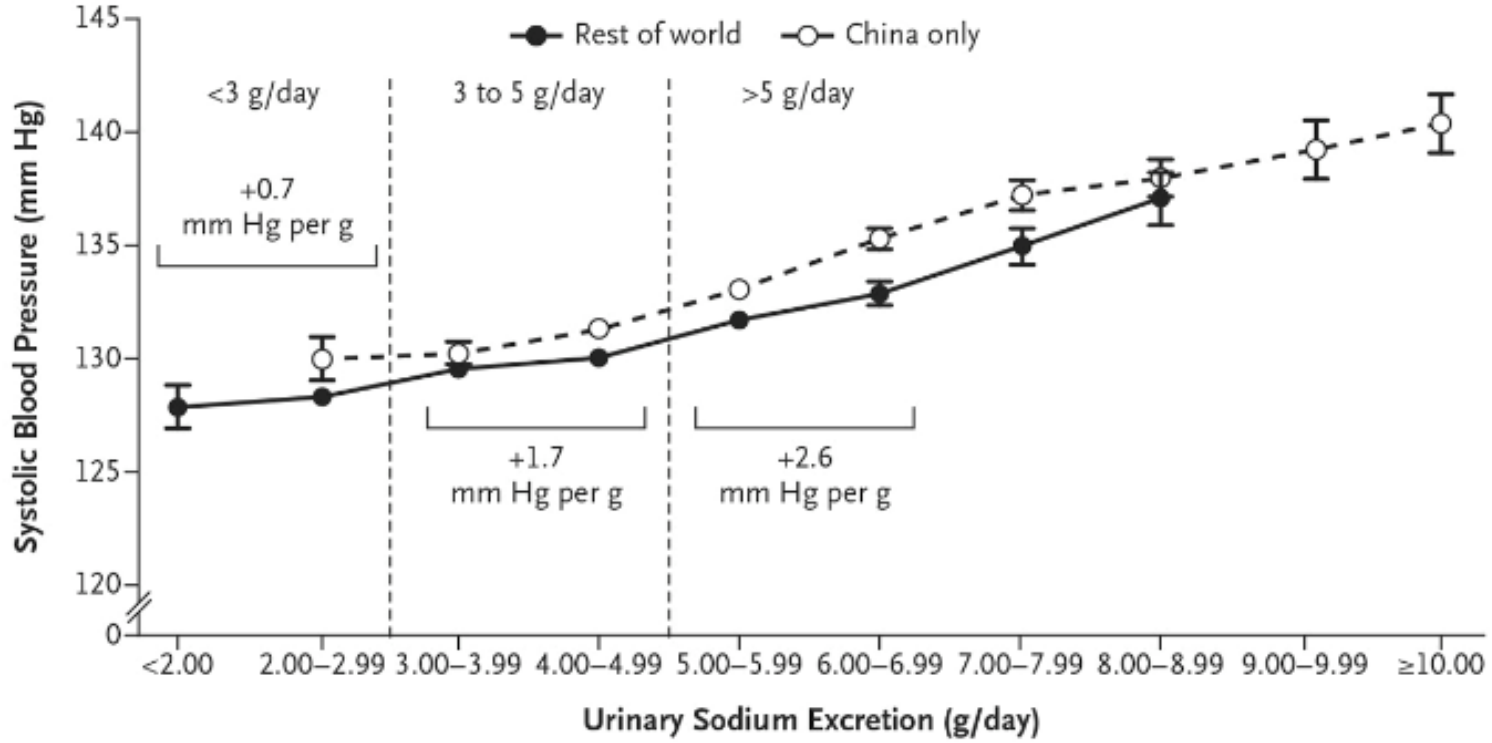
Bron: Kuipers, Oerdieet

Natrium en Kalium



Relatie NaCl met de bloeddruk

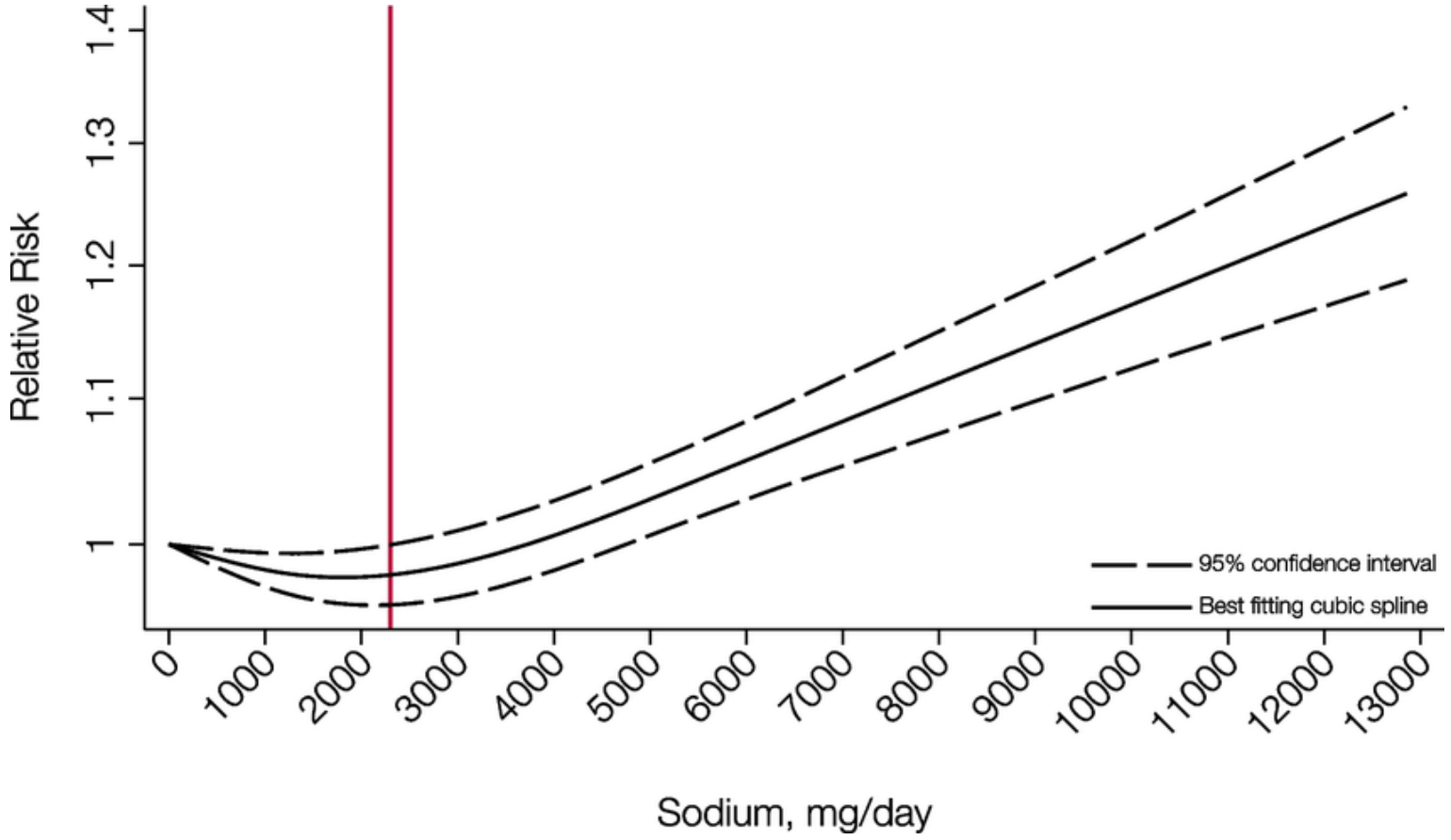
A



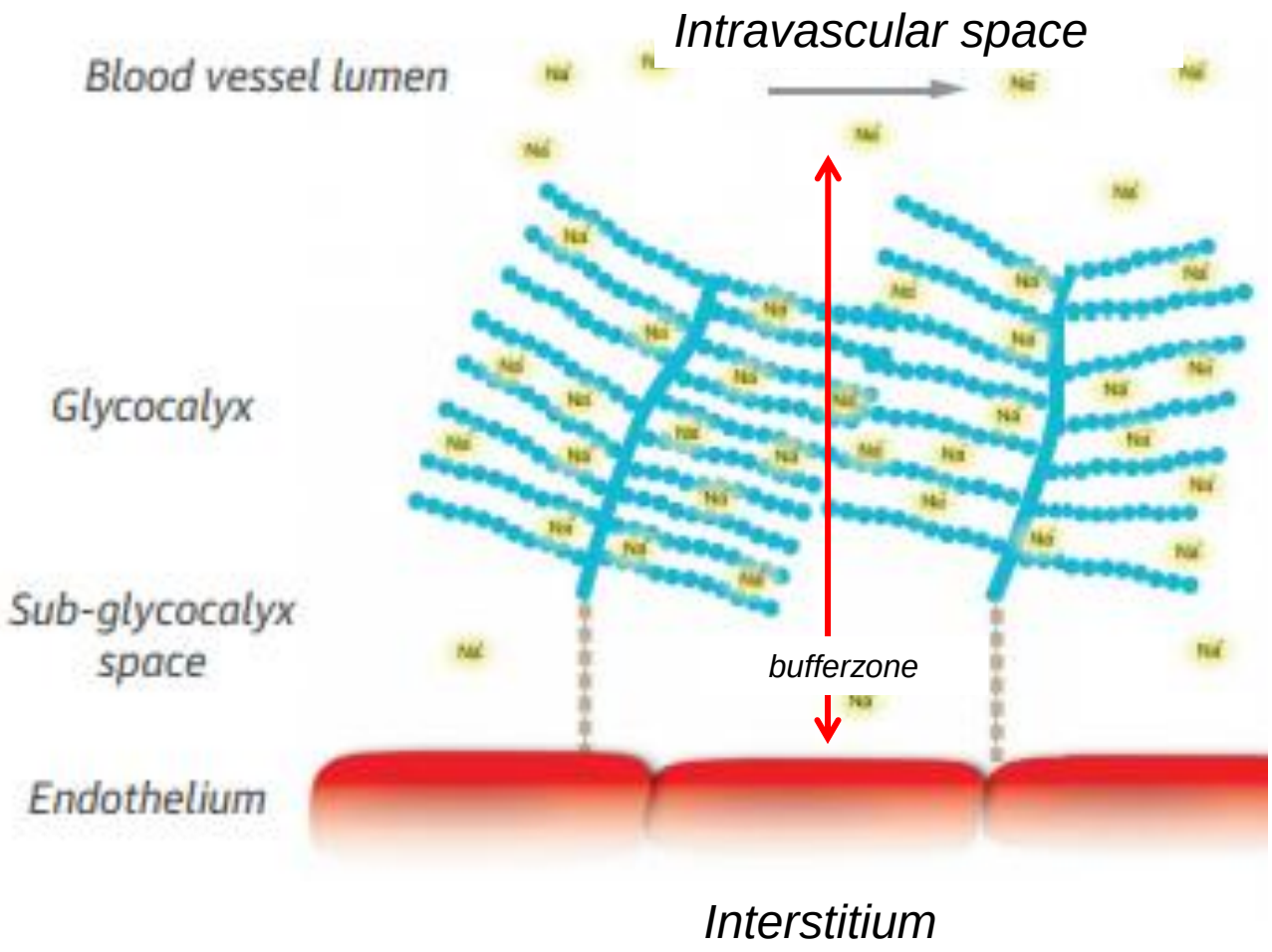
No. of Participants										
China		1876	6,012	9,794	10,101	7177	4093	2035	1002	952
Other countries	1613	7384	15,101	16,015	10,810	5211	2048	992		

Mente et al, NEJM, 2014

De klassieke gedachte over zout en CVD



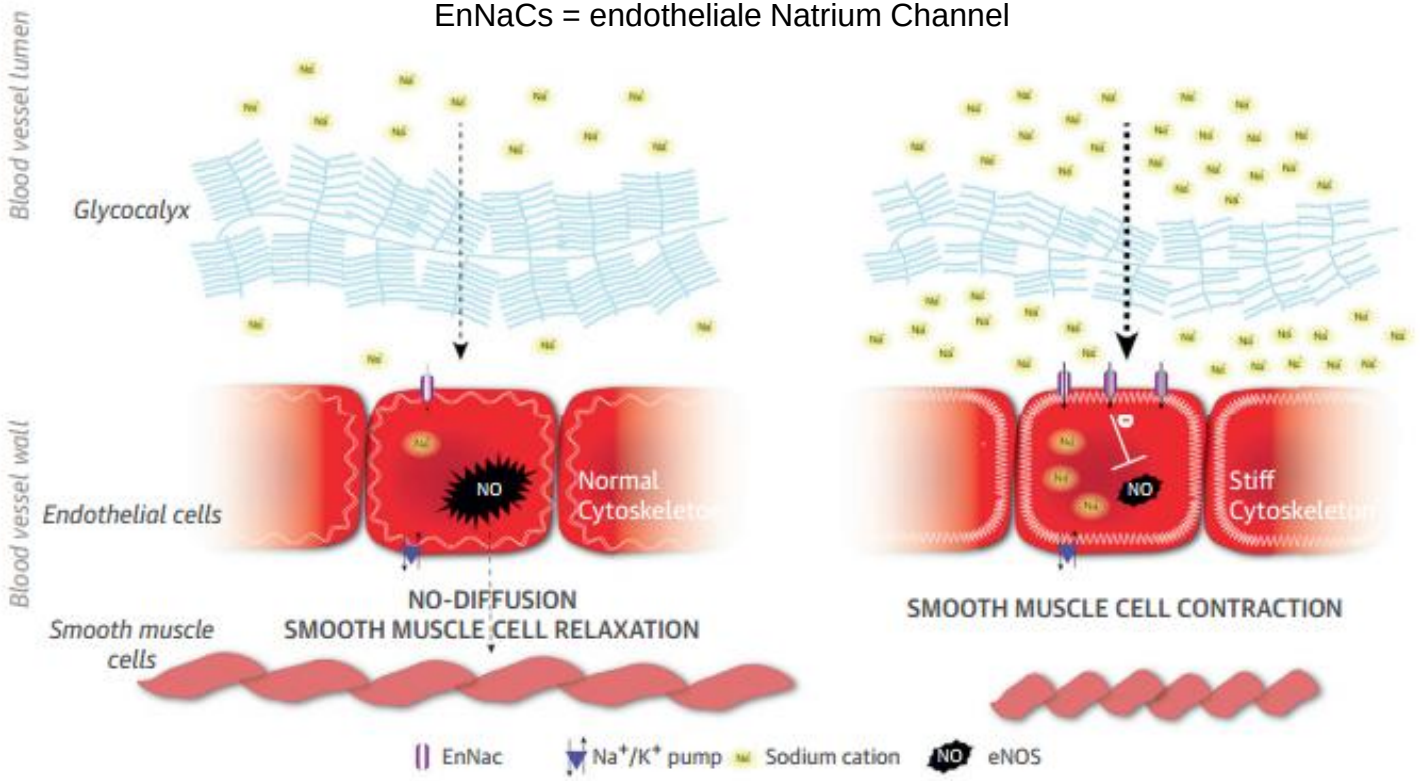
The too much salt (Na) scenario



GCX raakt verzadigd

Endotheeldysfunctie

EnNaCs = endotheliale Natrium Channel



Damage to the endothelial glycocalyx (eGC) leads to increased vascular permeability **(dotted arrow)**, diminished sodium (Na^+) buffer capacity, and disturbed mechanotransduction in response to shear stress. High Na^+ concentrations and high aldosterone concentration promote the abundance of endothelial sodium channels (EnNaCs) at the apical membrane of endothelial cells. Na^+ subsequently activates EnNaCs, altering endothelial cytoskeleton organization and stiffening the endothelial cell. High EnNaC activity and disturbed mechanotransduction influence smooth muscle cell contraction by impairing nitrous oxide (NO) production, a characteristic of endothelial dysfunction. eNOS = endothelial nitrous oxide synthase; Na^+/K^+ pump = sodium-potassium adenosine triphosphatase pump; NO = nitrous oxide.

Hoog Natrium

GCX verzadigd

Na influx naar bufferzone

GCX beschadigd (NO↓)

Toename EnNaCs

Na flux naar interstitium en endotheel

Water volgt osmo-gradient

Verstijven endotheellaag

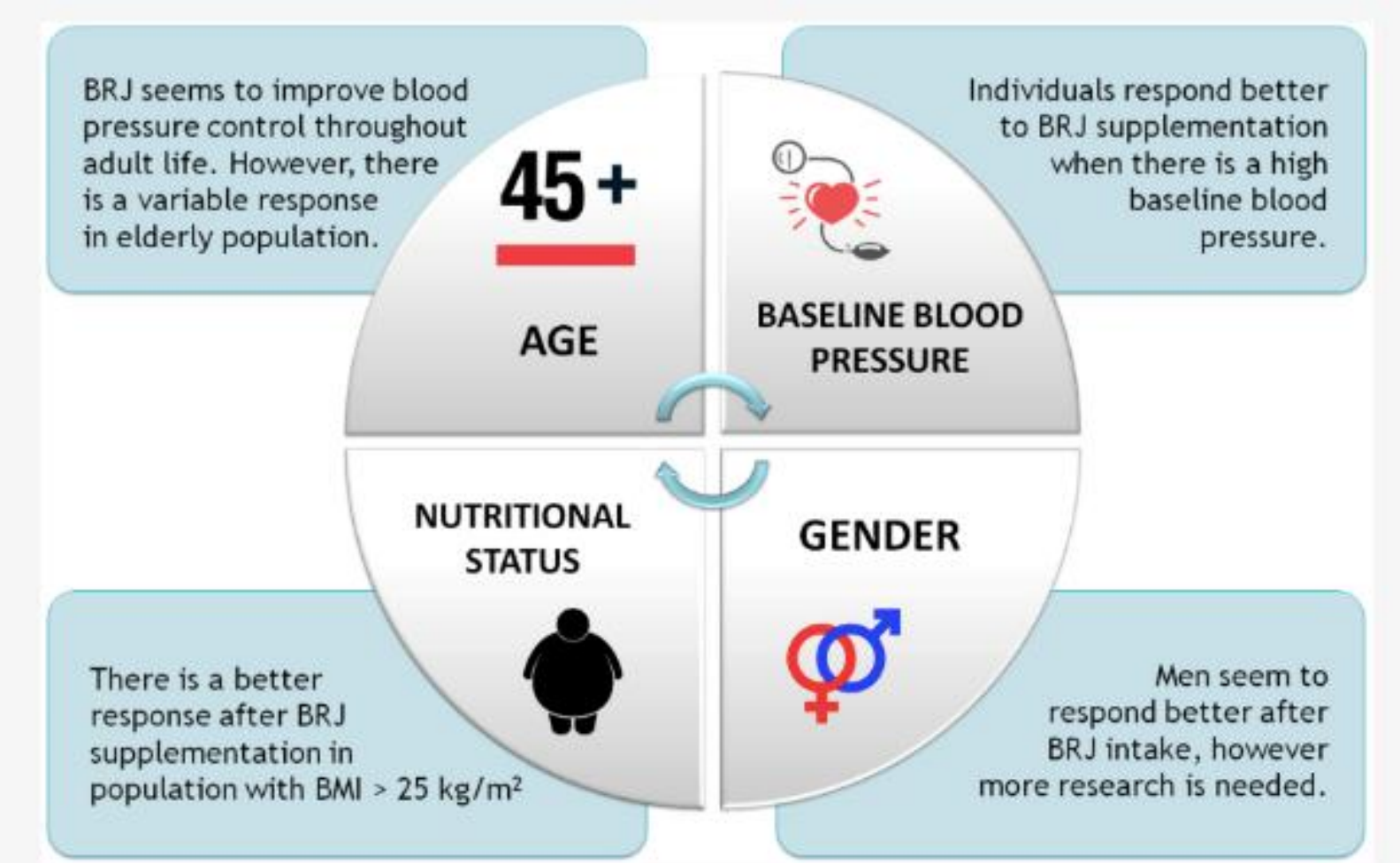
JACC VOL. 65, NO. 4, 2015
FEBRUARY 3, 2015:378–88

Nijst *et al.*
Interstitial Sodium in Heart Failure

NO-suppletie?

› Biomolecules. 2018 Nov 2;8(4):134. doi: 10.3390/biom8040134.

Dietary Nitrate from Beetroot Juice for Hypertension: A Systematic Review



NO-suppletie?

› Circ Heart Fail. 2017 Apr;10(4):e003534. doi: 10.1161/CIRCHEARTFAILURE.116.003534.

Association Between Use of Long-Acting Nitrates and Outcomes in Heart Failure With Preserved Ejection Fraction

Shir Lynn Lim [1], Lina Benson [1], Ulf Dahlström [1], Carolyn S P Lam [1], Lars H Lund [2]

Nitrates were associated with **worse composite outcome** in the matched HFpEF cohort, with 1-year event-free survival of 62% (95% CI, 60%-64%) versus 65% (95% CI, 63%-66%) and **hazard ratio of 1.11** (95% CI, 1.04-1.18; *P*=0.003).

NO-suppletie?

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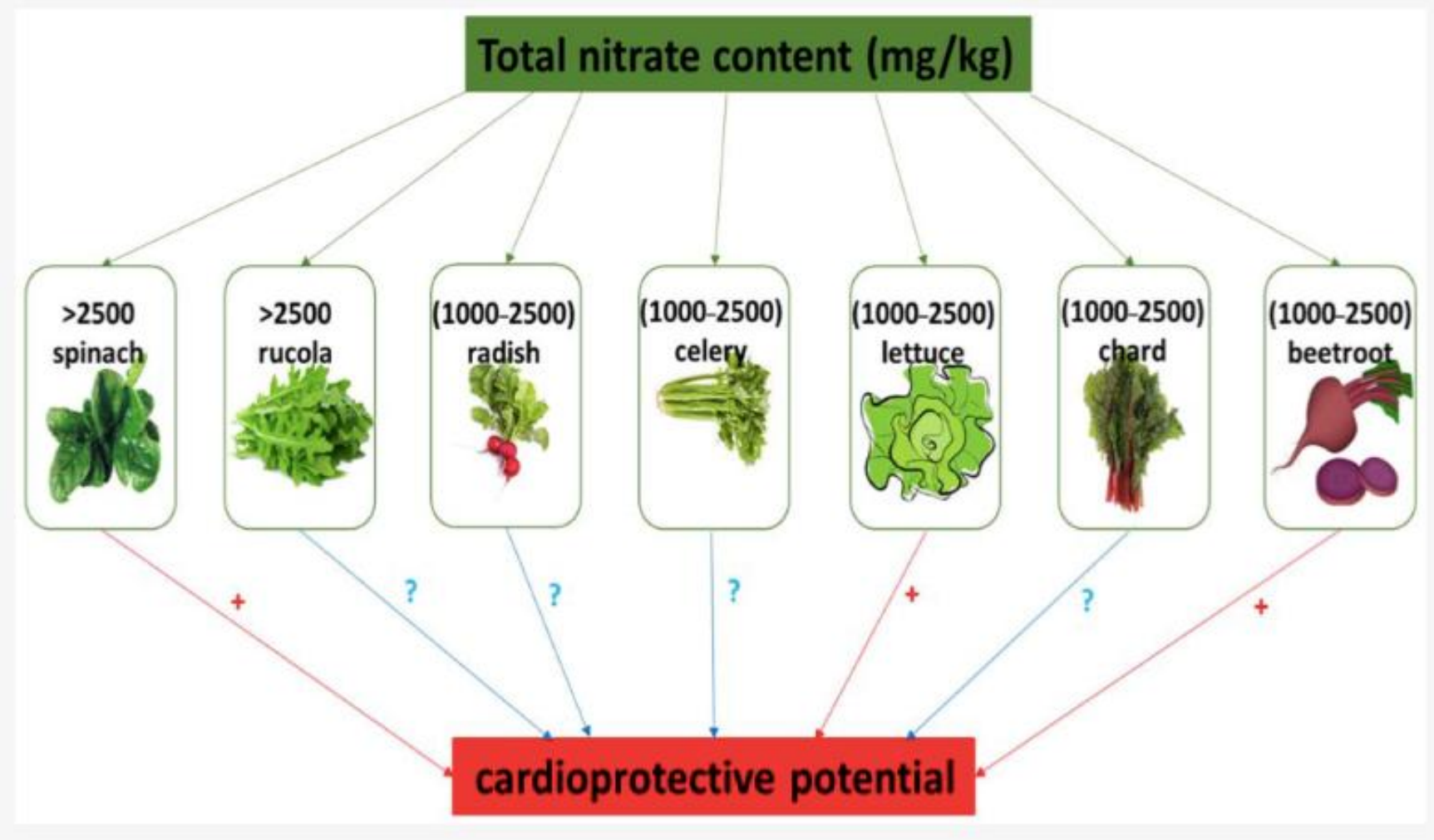
› J Card Fail. 2020 Feb;26(2):166-179. doi: 10.1016/j.cardfail.2019.10.014. Epub 2019 Nov 5.

Nutraceuticals in Patients With Heart Failure: A Systematic Review

Ingrid Hopper [1], Cia Connell [2], Tom Briffa [3], Carmine G De Pasquale [4], Andrea Driscoll [5], Peter M Kistler [6], Peter S Macdonald [7], Andrew Sindone [8], Liza Thomas [9], John J Atherton [10]

Studies that examined nitrate-rich beetroot juice were too small or underpowered to properly appraise clinical outcomes

Supplement of Voeding



Foods **2024**, *13*(5),691; https://doi.org/10.3390/foods13050691

frontiers in Physiology

ORIGINAL RESEARCH
published: 30 June 2015
doi: 10.3389/fphys.2015.00188

Sodium renders endothelial cells sticky for red blood cells

Hans Oberleithner, Mike Wälte and Kristina Kusche-Vihrog*

Medical Faculty, Institute of Physiology II, University of Münster, Münster, Germany

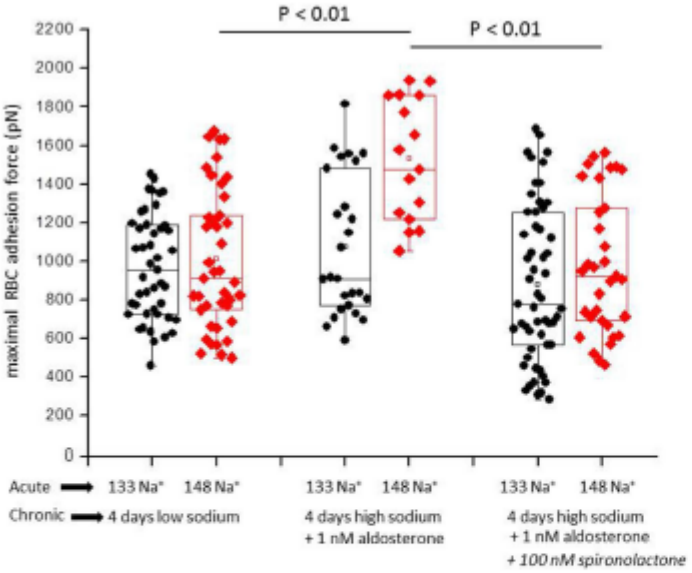


FIGURE 3 | Maximal RBC-EC interaction forces in different ambient Na^+ concentrations. "Acute" indicates measurements performed at a defined ambient Na^+ concentration within a time window of 30 min. "Chronic" indicates that the cells under study were maintained for 4 days in either low Na^+ (133 mM Na^+) or high Na^+ (148 mM Na^+) culture medium prior to the acute experiments. Each symbol represents the adhesion force of an endothelial cell. Presence of aldosterone and spironolactone as indicated.

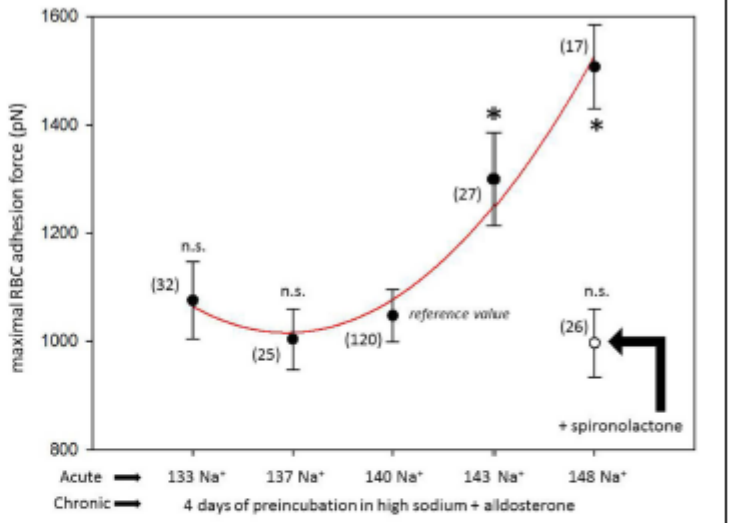


FIGURE 4 | Maximal RBC-EC interaction forces in different ambient Na^+ concentrations. "Acute" indicates measurements performed at a defined ambient Na^+ concentration within a time window of 30 min. "Chronic" indicates that all cells under study were maintained for 4 days in high Na^+ (148 mM Na^+ + 1 nM aldosterone) culture medium prior to the acute experiments. Presence of spironolactone as indicated. Symbols are mean values (±SE) of adhesion forces of individual cells (n = number of measurements given in parenthesis). The symbol * indicates that the mean value is significantly different ($P < 0.05$) in comparison to the 140 mM Na^+ reference value. The symbol $^{n.s.}$ indicates that the mean value is not significantly different in comparison to the 140 mM Na^+ reference value ($P > 0.05$).

Zout – minder, minder, minder?

Table 1. Guideline recommendations for sodium restriction in the general population.

Year, Name of Guideline	Sodium Restriction
2010, Dietary Guidelines for Americans [4]	<2.3 g/d in all adults <1.5 g/d in adults aged more than 50 years who are African American or with hypertension, diabetes, or chronic kidney disease
2013, World Health Organization [5]	<2 g/d in all adults
2020, American Heart Association [6]	<1.5 g/d in all adults
2010, Heart Failure Society of America [1]	2–3 g/d in all heart failure patients<2 g/d in patients with moderate to severe heart failure
2019, American Diabetic Association [7]	<2.3 g/d in patients with diabetes<1.5 g/d in patients with diabetes and hypertension
2016, European Society of Cardiology [8]	<5 g/d in all adults
2017, Canadian Cardiovascular Society [9]	<2 g/d in all adults
2015–2020 Dietary Guidelines for Americans [10]	2.3 g/d in all adults
2012, The Kidney disease: Improving Global Outcomes (KDIGO) [11]	<2 g/d in all patients with chronic disease not on dialysis

ORIGINAL ARTICLE

Nutritional impact of sodium reduction strategies on sodium intake from processed foods

MAH Hendriksen[1], J Verkaik-Kloosterman[1], MW Noort[2] and JMA van Raaij[1]

European Journal of Clinical Nutrition (2015) **69,** 805–810

In the Netherlands, sodium intake substantially exceeds the recommended intake of 2400 mg/day. Median sodium intake in adults was estimated to be 3400 mg/day.[4]

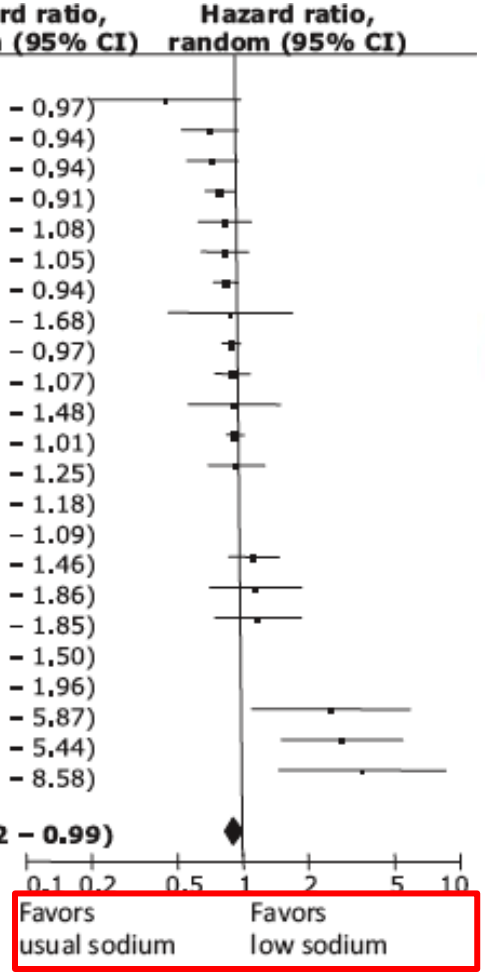
RESULTS: Sodium levels of processed foods could be reduced in most food groups by 50%, and this may reduce median sodium intake from foods by 38% (from 3042 to 1886 mg/day in adult men). Substitution of foods may reduce sodium intake by 47% (from 3042 to 1627 mg/day in adult men), owing to many low-sodium alternatives within food groups.

Compared With Usual Sodium Intake, Low- and Excessive-Sodium Diets Are Associated With Increased Mortality: A Meta-Analysis of cohorts

Niels Graudal,[1] Gesche Jürgens,[2] Bo Baslund,[1] and Michael H. Alderman[3]

Study	Total	Weight	Hazard ratio, random (95% CI)
Lennie[35] mild heart failure	134	1.3%	0.44 (0.20 – 0.97)
Alderman,[19] M	1,900	5.4%	0.70 (0.52 – 0.94)
Ekinci[36]	620	6.0%	0.72 (0.55 – 0.94)
Cohen[26] (NH II)	7,154	9.2%	0.78 (0.67 – 0.91)
Stolarz-Skrypek[37]	2,454	5.8%	0.82 (0.62 – 1.08)
Tunstall-Pedoe,[20] M	3,453	6.5%	0.82 (0.64 – 1.05)
Cohen[29] (NH III)	6,525	9.9%	0.83 (0.73 – 0.94)
Thomas[15]	2,105	1.7%	0.87 (0.45 – 1.68)
Alderman[21] (NH I)	11,346	10.7%	0.88 (0.80 – 0.97)
Gardener[16]	2,099	8.2%	0.89 (0.74 – 1.07)
Tuomilehto,[24] F	1,263	2.8%	0.91 (0.56 – 1.48)
O'Donnel[38]	23,327	10.9%	0.92 (0.84 – 1.01)
Tunstall-Pedoe,[20] F	4,700	5.4%	0.93 (0.69 – 1.25)
Yang,[30] NW (NH III)	4,000	0.0%	0.93 (0.73 – 1.18)
He,[22] NW (NH I)	6,797	0.0%	0.98 (0.88 – 1.09)
Geleijnse[27]	1,578	6.2%	1.12 (0.86 – 1.46)
Taylor[41] (Appel 43)	291	2.8%	1.14 (0.70 – 1.86)
Alderman,[19] F	1,037	3.1%	1.17 (0.74 – 1.85)
He,[22] OW (NH I)	2,688	0.0%	1.32 (1.16 – 1.50)
Yang,[30] OW (NH III)	5,200	0.0%	1.44 (1.06 – 1.96)
Lennie[35] severe heart failure	163	1.1%	2.54 (1.10 – 5.87)
Costa[41]	372	1.8%	2.86 (1.50 – 5.44)
Arcand[34]	123	1.0%	3.54 (1.46 – 8.58)
Total (95% CI)	**70,644**	**100.0%**	**0.91 (0.82 – 0.99)**

Heterogeneity: $\tau^2 = 0.02$; $\chi^2 = 46.41$, df = 18 ($P = 0.0003$); $I^2 = 61\%$
Test for overall effect: $Z = 2.07$ ($P = 0.04$)



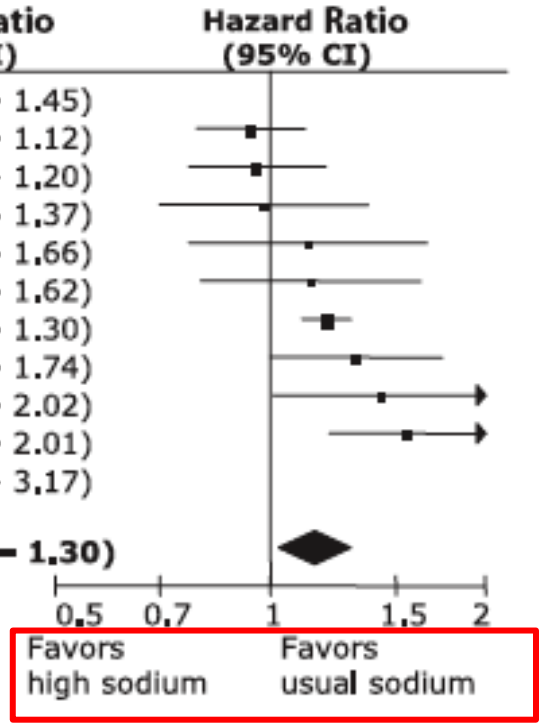
Graudal et al, Am J Hypertension, 2014

Compared With Usual Sodium Intake, Low- and Excessive-Sodium Diets Are Associated With Increased Mortality: A Meta-Analysis of cohorts

Niels Graudal,[1] Gesche Jürgens,[2] Bo Baslund,[1] and Michael H. Alderman[3]

Study	Total	Weight	Hazard Ratio (95% CI)
Yang,[30] NW	2,667	0.0%	0.86 (0.51 – 1.45)
Cohen[29] (NH III)	6,525	15.5%	0.94 (0.79 – 1.12)
Tunstall-Pedoe,[20] M	4,604	12.7%	0.96 (0.77 – 1.20)
Tuomiletho,[24] M, NW	659	7.9%	0.98 (0.70 – 1.37)
Stolarz-Skrzypek[37]	2,454	6.5%	1.13 (0.77 – 1.66)
Tunstall-Pedoe,[20] F	3,525	7.3%	1.14 (0.80 – 1.62)
O'Donnel[38]	25,408	21.5%	1.20 (1.11 – 1.30)
Gardener[16]	2,337	10.0%	1.32 (1.00 – 1.74)
Thomas[15]	2,105	7.5%	1.43 (1.01 – 2.02)
Tuomilehto,[24] M, OW	514	11.0%	1.56 (1.21 – 2.01)
Yang,[30] OW	3,467	0.0%	2.07 (1.35 – 3.17)
Total (95% CI)	**48131**	**100.0%**	**1.16 (1.03 – 1.30)**

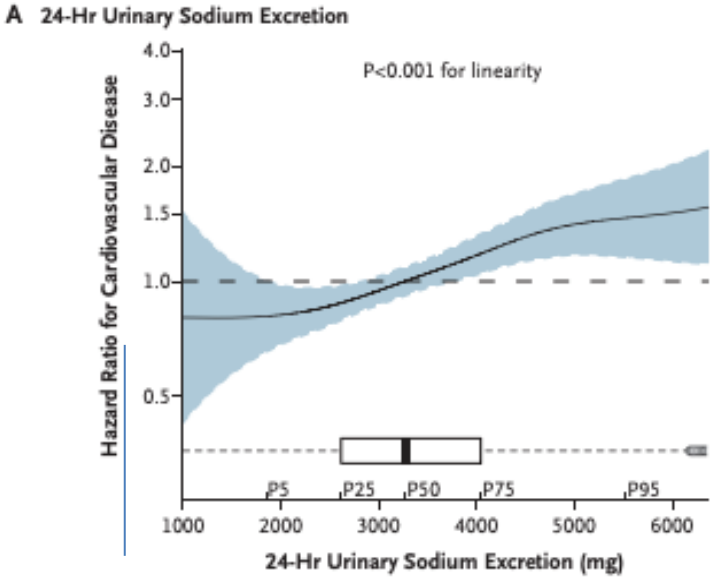
Heterogeneity: $\tau^2 = 0.01$; $\chi^2 = 17.61$, df = 8 ($P = 0.02$); $I^2 = 55\%$
Test for overall effect: $Z = 2.46$ ($P = 0.01$)



Our study extends the IOM report by identifying a specific range of sodium intake (2,645–4,945 mg) associated with the most favorable health outcomes, within which variation in sodium intake is not associated with variation in mortality.

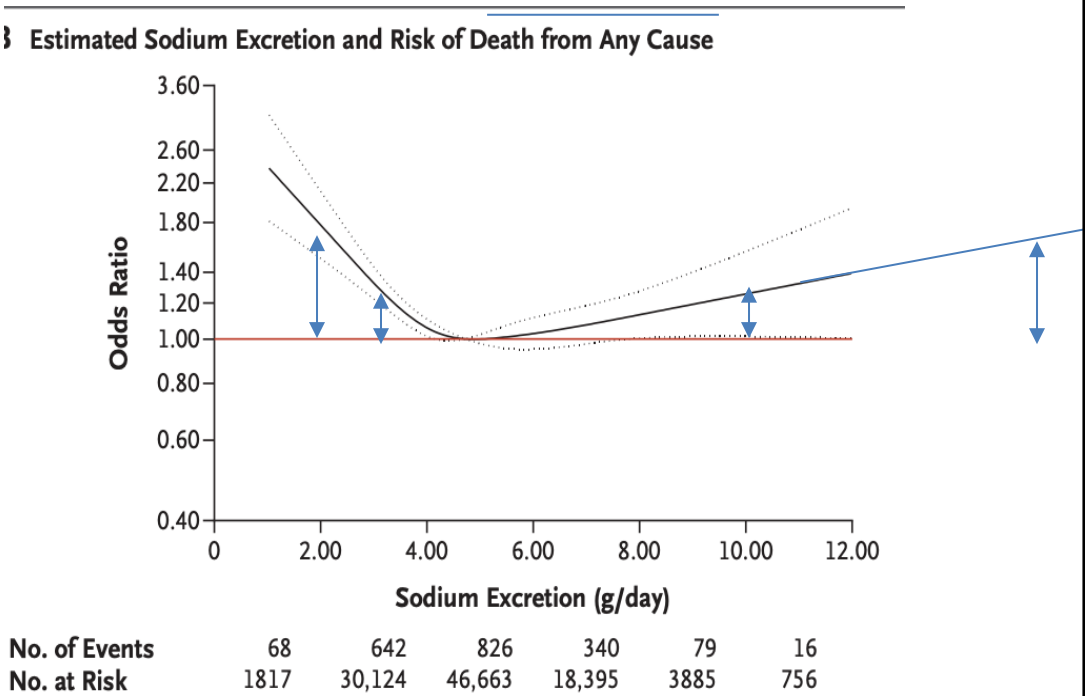
Graudal et al, Am J Hypertension, 2014

Beter iets te veel dan te weinig…



Minder cardiovasculaire dood

Maar: Hogere sterfte,
- door vallen bij *hypo*tensie?



in a large, international, prospective cohort study. An estimated sodium intake between 3 g per day and 6 g per day was associated with a lower risk of death and cardiovascular events than either a higher or lower estimated level of sodium intake. As compared with an estimated potassium

Ma et al, NEJM, 2022

O'Donnell NEJM 2014

ESC European Society of Cardiology

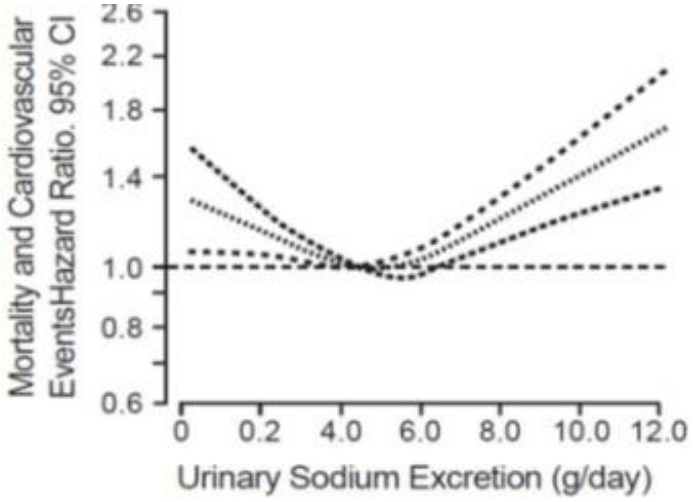
European Heart Journal (2020) **41**, 3363–3373
doi:10.1093/eurheartj/ehaa586

CLINICAL REVIEW
Prevention

Salt and cardiovascular disease: insufficient evidence to recommend low sodium intake

Table 1 **Categories of sodium (salt) intake**

Sodium intake categories	Sodium (salt) g/day	Sodium (mmol/day)	~Teaspoons of salt
Low sodium intake	Sodium <2.3 g/day (salt <5.75 g/day)	Sodium <100 mmol	<1 teaspoon of salt
Moderate sodium intake	Sodium 2.3–4.6 g/day (salt 5.75–11.5 g/day)	Sodium 100–200 mmol/day	1–2 teaspoons of salt
High sodium intake	Sodium >4.6 g/day (Salt 11.5 g/day)	Sodium >200 mmol/day	>2 teaspoons of salt



ORIGINAL ARTICLE

Nutritional impact of sodium reduction strategies on sodium intake from processed foods

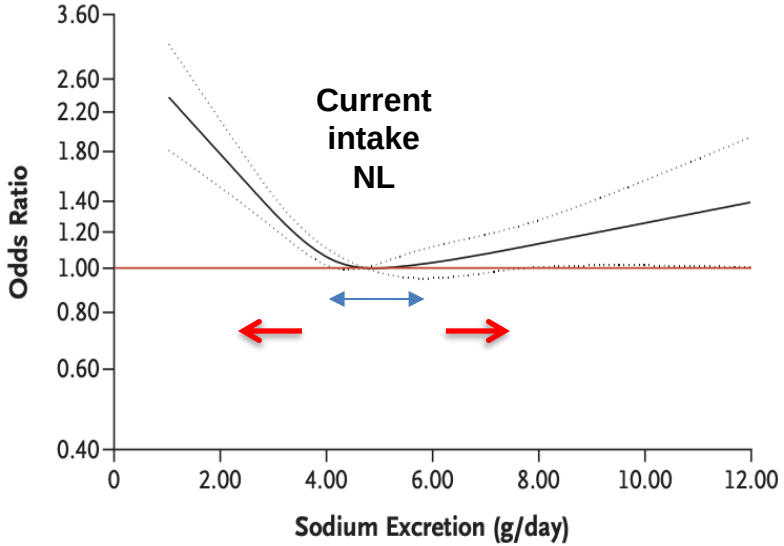
MAH Hendriksen[1], J Verkaik-Kloosterman[1], MW Noort[2] and JMA van Raaij[1]

European Journal of Clinical Nutrition (2015) **69,** 805–810

In the Netherlands, sodium intake substantially exceeds the recommended intake of 2400 mg/day. Median sodium intake in adults was estimated to be 3400 mg/day.[4]

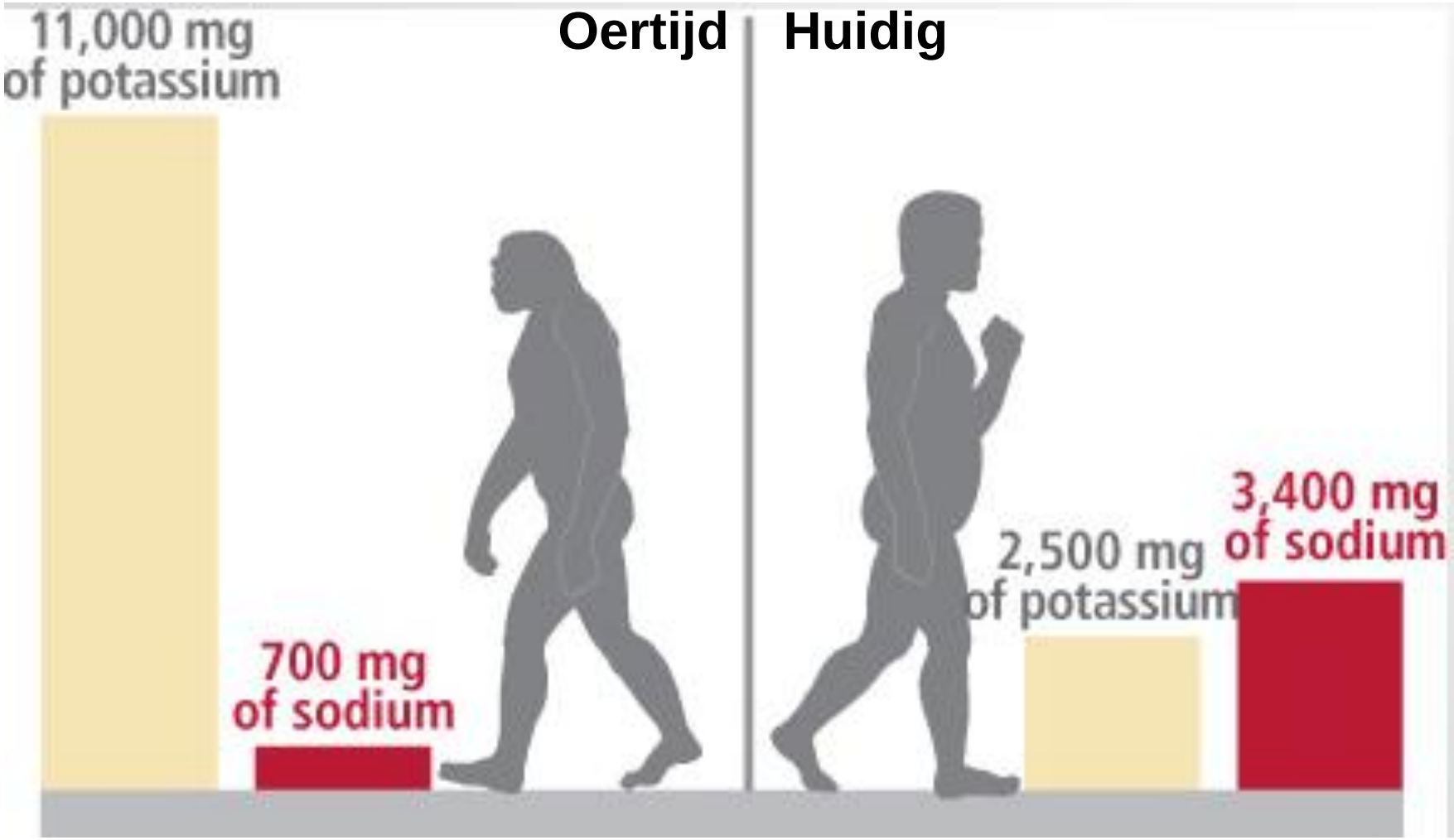
RESULTS: Sodium levels of processed foods could be reduced in most food groups by 50%, and this may reduce median sodium intake from foods by 38% (from 3042 to 1886 mg/day in adult men). Substitution of foods may reduce sodium intake by 47% (from 3042 to 1627 mg/day in adult men), owing to many low-sodium alternatives within food groups.

B Estimated Sodium Excretion and Risk of Death from Any Cause



No. of Events	68	642	826	340	79	16
No. at Risk	1817	30,124	46,663	18,395	3885	756

Natrium en Kalium

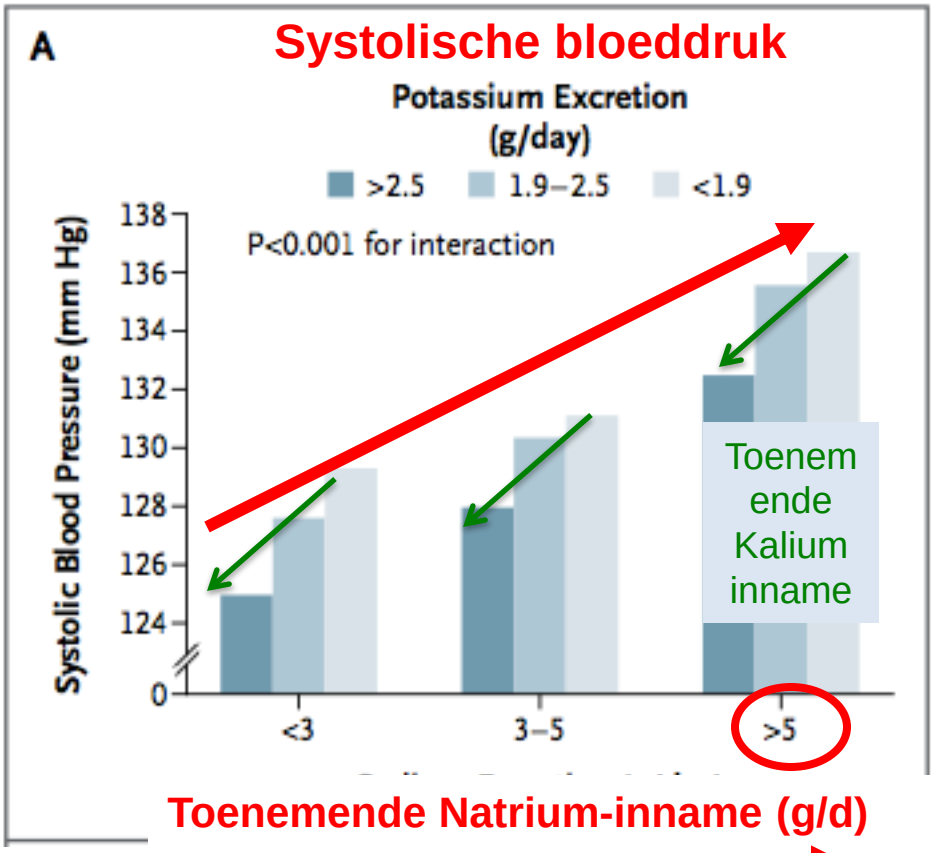


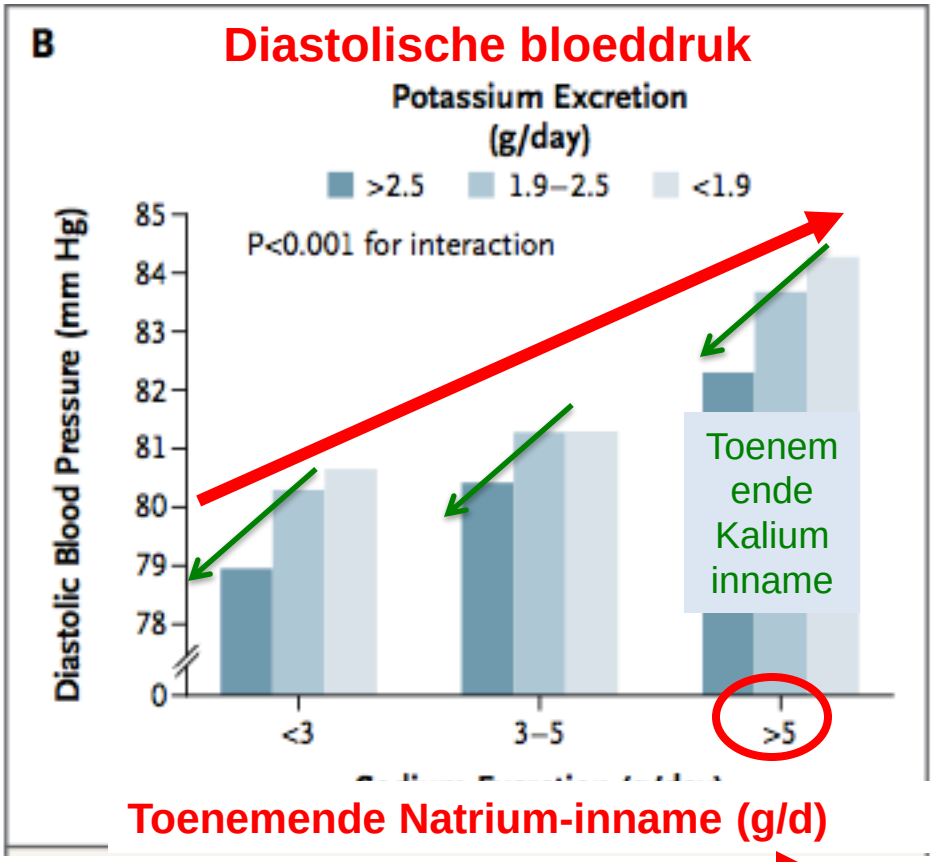
ESTABLISHED IN 1812 AUGUST 14, 2014 VOL. 371 NO. 7

The NEW ENGLAND JOURNAL of MEDICINE

Association of Urinary Sodium and Potassium Excretion with Blood Pressure

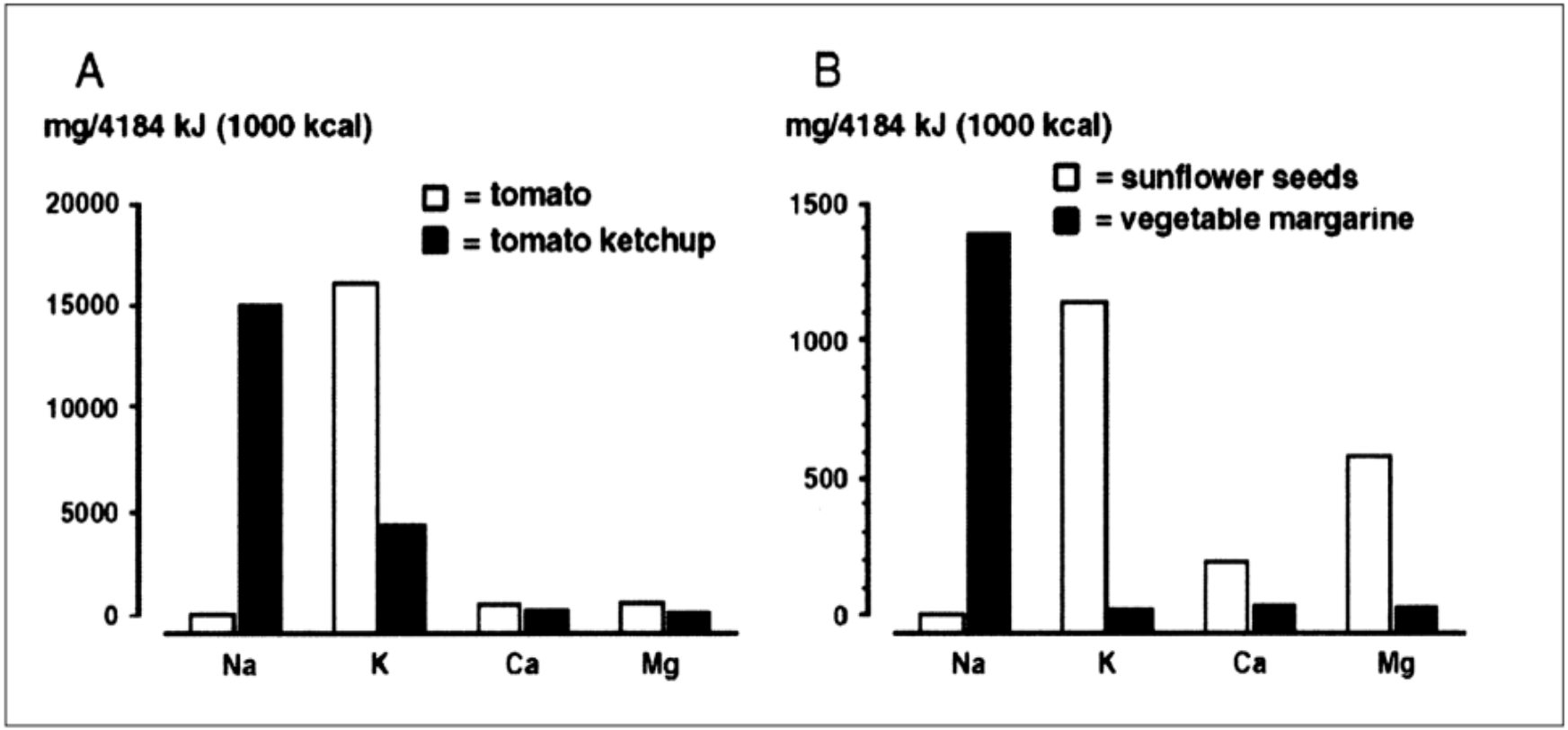
Andrew Mente, Ph.D., Martin J. O'Donnell, M.B., Ph.D., Sumathy Rangarajan, M.Sc., Matthew J. McQueen, M.B., B.Ch.,





Kalium compenseert het bloeddrukverhogende effect van natrium

Wat ‘bewerken’ met Na/K doet



Figuur 3. Natrium, kalium, calcium en magnesium gehaltes van tomaten, tomaten ketchup, zonnebloemzaden en margarine.

Karppanen &Mervaala, Progress in Cardiovasc Disease 2006

JOZO met groen bevat tot 66% kalium i.p.v. natrium

Effect of Salt Substitution on Cardiovascular Events and Death

Neal B et al. DOI: 10.1056/NEJMoa2105675

Outcomes	Salt Substitute	Regular Salt	Rate Ratio (95% CI)	P Value
	no. of events per 1000 person-yr			
Stroke	29.14	33.65	0.86 (0.77–0.96)	P=0.006
Major Adverse CV Events	49.09	56.29	0.87 (0.80–0.94)	P<0.001
Death from Any Cause	39.28	44.61	0.88 (0.82–0.95)	P<0.001
Hyperkalemia	3.35	3.30	1.04 (0.80–1.37)	P=0.76

September 16, 2021

N Engl J Med 2021; 385:1067-1077

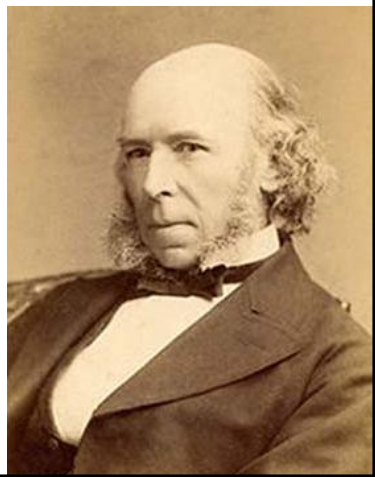
Geen kant- en klaar producten

Natrium

Kalium

Take home message No. 9:

Haal kalium bij voorkeur uit je voeding en gebruik in geval van tafelzout, zout met kalium en jodium



Wat eten mensen gemiddeld?

Tabel 18: Percentage Westerlingen dat aan ADH voldoet

Nutriënt	Aanbeveling	Percentage
Natrium	2400 mg	100
Selenium	70 ug	91
Riboflavine / B2	1.7 mg	89
IJzer	18 mg	89
Niacine / B3	20 mg	87
Fosfor	1000 mg	87
Koper	2 mg	84
Thiamine / B1	1.5 mg	82
Vitamine B12	6 ug	80
Pyridoxine / B6	2 mg	74
Zink	15 mg	71
Foliumzuur	400 ug	60
Vitamine C	60 mg	51
Vitamine A	900 ug	46
Magnesium	400 mg	43
Vitamine E	30 IU	14
Jodium	150 ug	<10*
Kalium	4700 mg	8

* Indien het gebruik van gejodeerd zout (o.a. in brood) niet wordt meegerekend

Bron: Kuipers, Oerdieet

Rijksinstituut voor Volksgezondheid en Milieu
Ministerie van Volksgezondheid, Welzijn en Sport

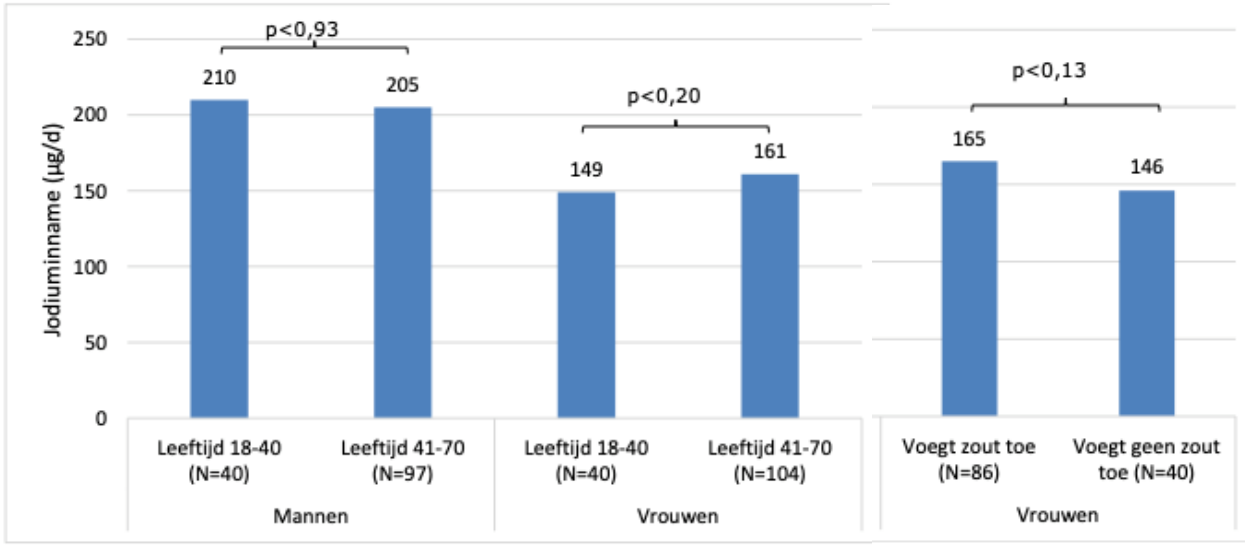
https://www.rivm.nl/bibliotheek/rapporten/2022-0066.pdf

Volwassenen krijgen dagelijks voldoende jodium binnen

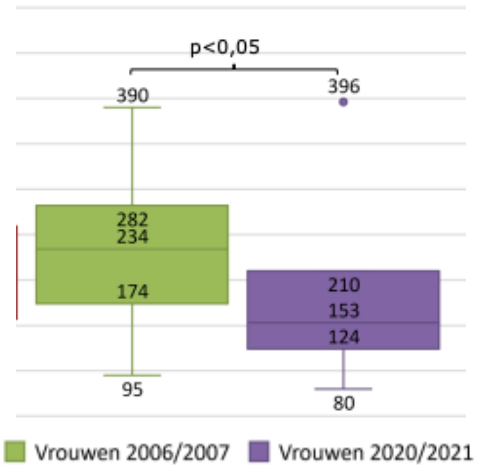
Publicatiedatum 01-07-2022 | 09:00

The WHO recommends iodine fortification to achieve sufficient iodine intake (150 µg/d in non-pregnant adults)

Zwangere en borstvoedende vrouw: behoefte: 175 en 200 mcg **jodium** per dag



Figuur 3 Mediane jodiuminname (in µg/d) in 2020/2021 in het Lifelines cohort, opgesplitst voor geslacht en leeftijd (geselecteerd op leeftijd, BMI categorie en opleidingsniveau).

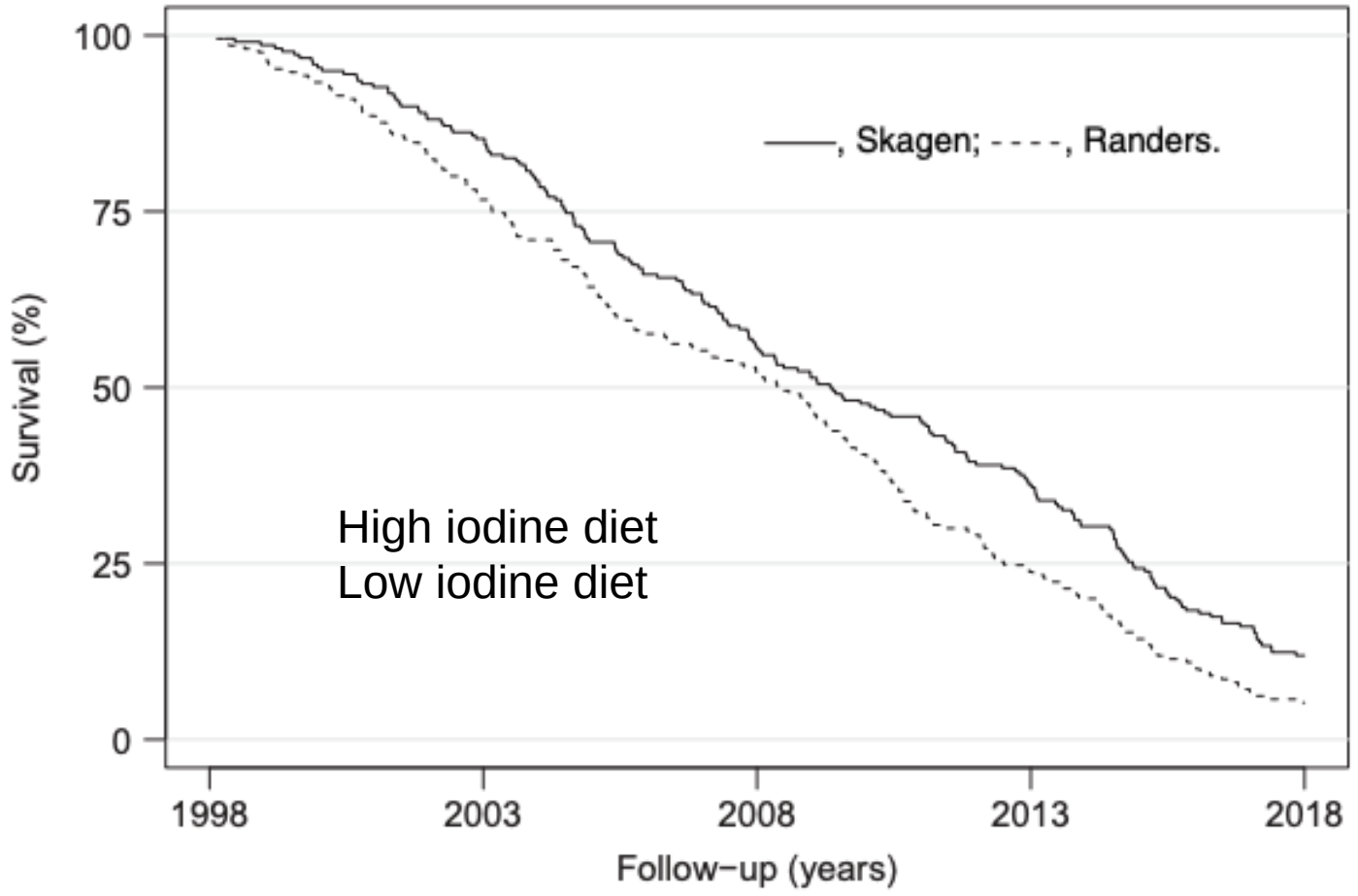


World Health Organization/International Council for the Control of the Iodine Deficiency Disorders/United Nations Childrens Fund (WHO/ICCIDD/UNICEF) (2007) Assessment of Iodine Deficiency Disorders and Monitoring Their Elimination, 3rd ed. Geneva: WHO.

Long-term iodine nutrition is associated with longevity in older adults: a 20 years' follow-up of the Randers–Skagen study

British Journal of Nutrition (2021), 125, 260–265

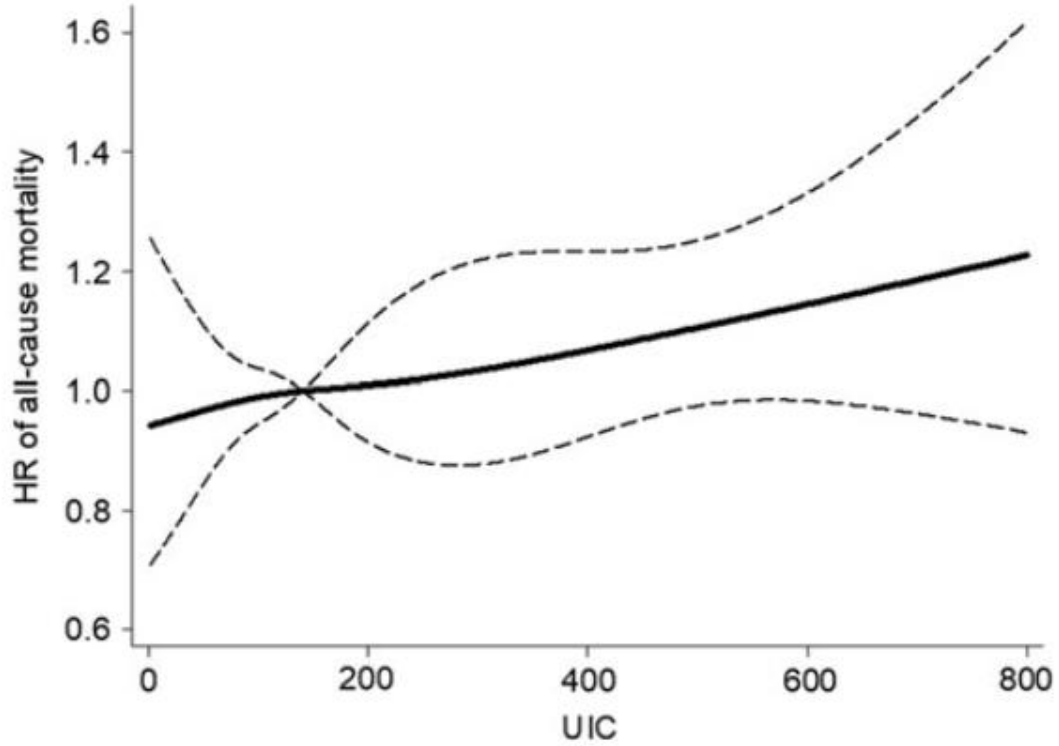
Johannes Riis[1,2*], Klaus M. Pedersen[3], Mathias B. Danielsen[1,2], Gustav V. B. Sørensen[1,2], Martin G. Jørgensen[1], Stine L. Andersen[4], Allan Carlé[5], Inge B. Pedersen[5], Christian Torp-Pedersen[6,7] and Stig Andersen[1,2]



Urinary Iodine Concentration and Mortality Among U.S. Adults

THYROID
Volume 28, Number 7, 2018

Kosuke Inoue,[1,2] Angela M. Leung,[3,4] Takehiro Sugiyama,[5,6]
Tetsuro Tsujimoto,[7] Noriko Makita,[2] Masaomi Nangaku,[2] and Beate R. Ritz[1]



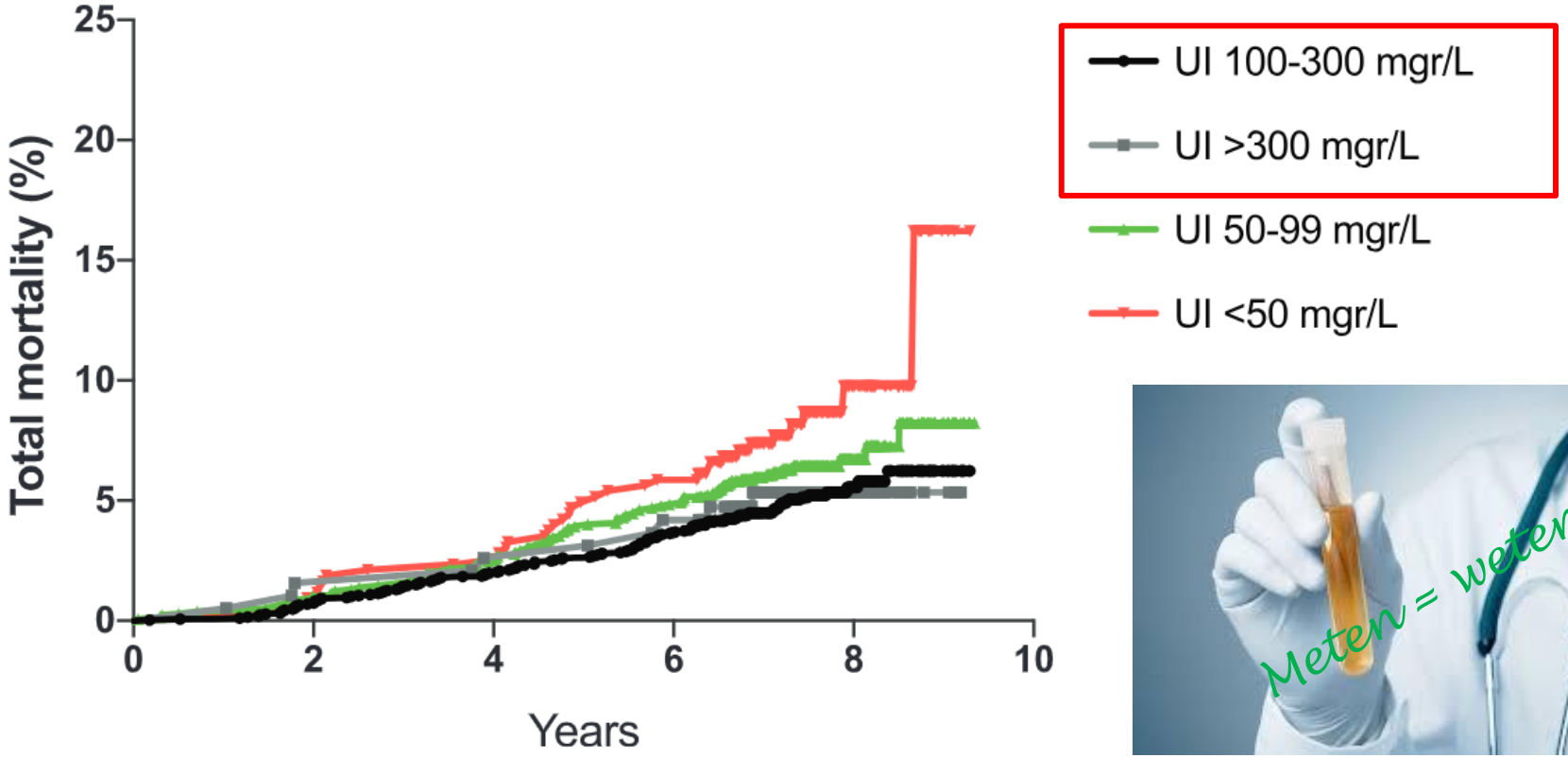
Association for UIC
- < 50: ns
- 50-100: ns
- 100-299 (ref)
- 300-399: ns
- >400: HR 1.19
  - CI 1.04-1.37

Conclusion: Higher all-cause mortality among those with excess iodine intake compared to individuals with adequate iodine intake highlights the importance of monitoring population iodine status. Further studies with longitudinal measures of iodine status are needed to validate these results and to assess the potential risks excess iodine intake may have on long-term health outcomes.

Iodine Deficiency and Mortality in Spanish Adults: Di@bet.es Study

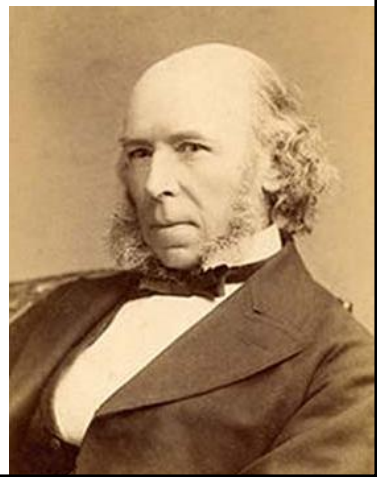
THYROID
Volume 31, Number 1, 2021

Cristina Maldonado-Araque,[1,2] Sergio Valdés,[1,2] Rocío Badía-Guillén,[1] Ana Lago-Sampedro,[1,2] Natalia Colomo,[1,2] Eduardo Garcia-Fuentes,[3] Carolina Gutierrez-Repiso,[4,5] Albert Goday,[6] Alfonso Calle-Pascual,[2,7] Luis Castaño,[2,8,9] Conxa Castell,[10] Elías Delgado,[9,11] Edelmiro Menendez,[9,11] Josep Franch-Nadal,[2,12] Sonia Gaztambide,[2,9,13] Joan Girbés,[14] Francisco Javier Chaves,[2,15] Federico Soriguer,[1,2] and Gemma Rojo-Martínez[1,2]



Take home message No. 10:

Haal jodium bij voorkeur uit je voeding
en overweeg je eigen ‘status’ te bepalen
- streef 100-300 mg/L -



Wat eten mensen gemiddeld?

Tabel 18: Percentage Westerlingen dat aan ADH voldoet

Nutriënt	Aanbeveling	Percentage
Natrium	2400 mg	100
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Fosfor	1000 mg	87
Koper	2 mg	84
Thiamine / B1	1.5 mg	82
Vitamine B12	6 ug	80
Pyridoxine / B6	2 mg	74
Zink	15 mg	71
Foliumzuur	400 ug	60
Vitamine C	60 mg	51
Vitamine A	900 ug	46
Magnesium	400 mg	43
Vitamine E	30 IU	14
Jodium	150 ug	<10*
Kalium	4700 mg	8

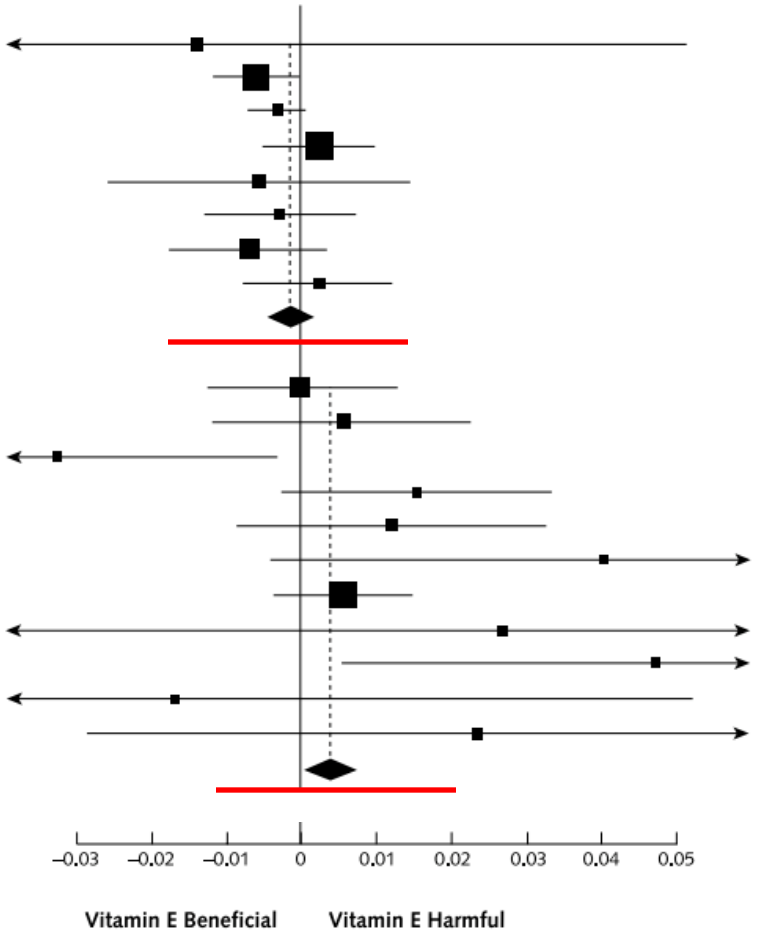
* Indien het gebruik van gejodeerd zout (o.a. in brood) niet wordt meegerekend

Bron: Kuipers, Oerdieet

Meta-Analysis: High-Dosage Vitamin E Supplementation May Increase All-Cause Mortality

Edgar R. Miller III, MD, PhD; Roberto Pastor-Barriuso, PhD; Darshan Dalal, MD, MPH; Rudolph A. Riemersma, PhD, FRCPE; Lawrence J. Appel, MD, MPH; and Eliseo Guallar, MD, DrPH

Study, Year (Reference)	Vitamin E Dosage, *IU/d*	Deaths/Participants, *n/n* Vitamin E	Deaths/Participants, *n/n* Control
Low-dosage vitamin E			
MIN.VIT.AOX, 1999 (35)	16.5	100/361	106/364
Linxian A, 1993 (36)	33	1018/14 792	1109/14 792
SU.VI.MAX, 2004 (37)	33	76/6481	98/6536
ATBC, 1994 (38, 39)	50	1800/14 564	1770/14 569
Linxian B, 1993 (40)	60	157/1657	167/1661
Linqu, 2001 (41)	200	38/1706	43/1705
GISSI, 1999 (42)	330	488/5666	529/5668
PPP, 2001 (43)	330	72/2231	68/2264
Total (low dosage)			
High-dosage vitamin E			
HOPE, 2000 (44)	400	535/4761	537/4780
AREDS, 2001 (45)	400	251/2370	240/2387
PPS, 1994 (46)	440	15/433	29/431
VECAT, 2004 (47)	500	20/595	11/598
CHAOS, 1996 (8, 9)	600	68/1035	52/967
REACT, 2002 (48)	660	9/149	3/148
MRC/BHF HPS, 2002 (49)	660	1446/10 269	1389/10 267
SPACE, 2000 (50)	800	31/97	29/99
WAVE, 2002 (51)	800	16/212	6/211
ADCS, 1997 (52)	2000	19/170	22/171
DATATOP, 1998 (53)	2000	73/399	64/401
Total (high dosage)			



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Vitamine A	900 ug	46
Magnesium	400 mg	43
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Jodium	150 ug	<10*
Kalium	4700 mg	8

* Indien het gebruik van gejodeerd zout (o.a. in brood) niet wordt meegerekend

Bron: Kuipers, Oerdieet

Use of antioxidant vitamins for the prevention of cardiovascular disease: meta-analysis of randomised trials

Deepak P Vivekananthan, Marc S Penn, Shelly K Sapp, Amy Hsu, Eric J Topol

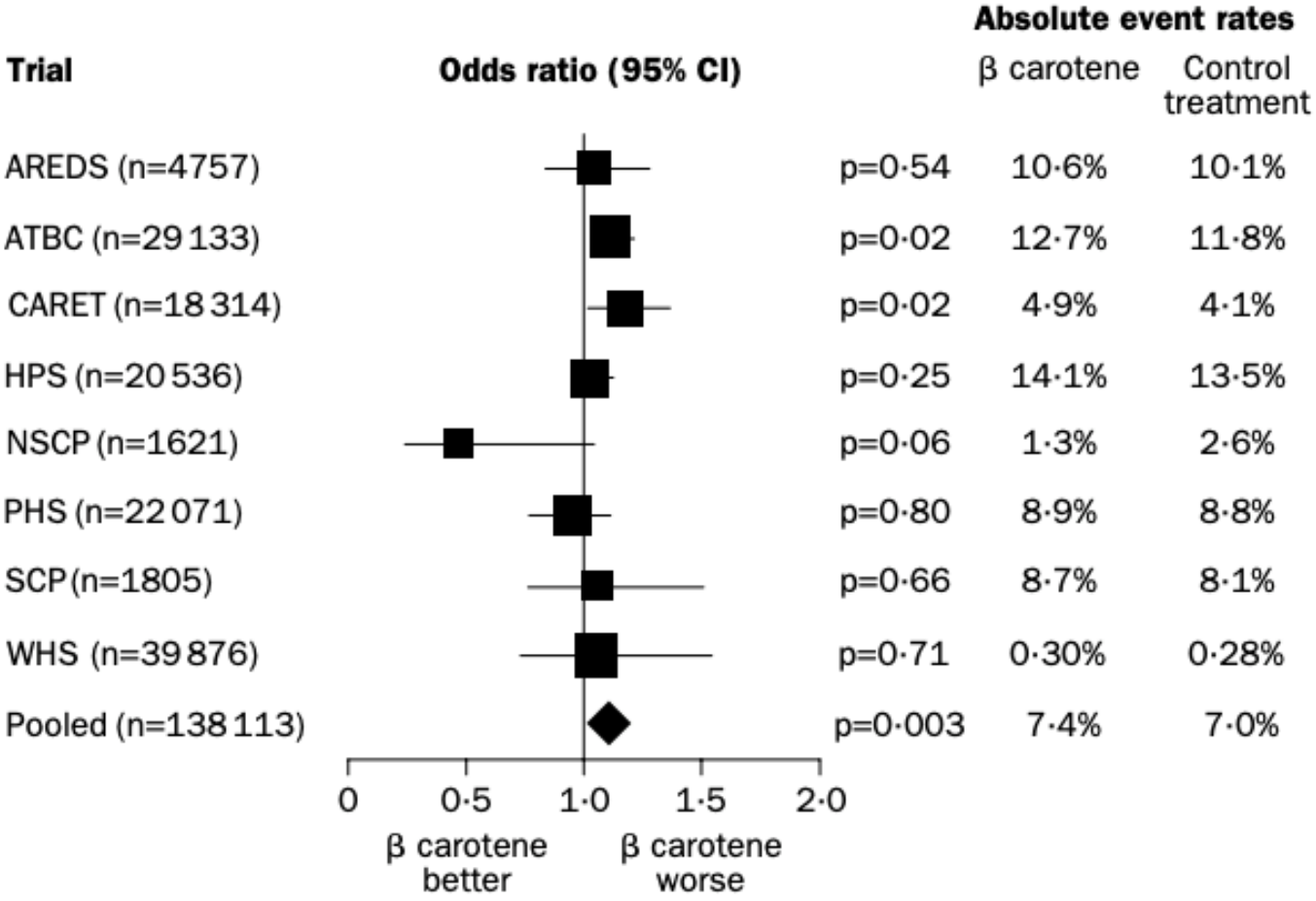


Figure 1: **Odds ratios (95% CI) of all-cause mortality for individuals treated with β carotene or control therapy**

Lancet 2003; **361:** 2017–23

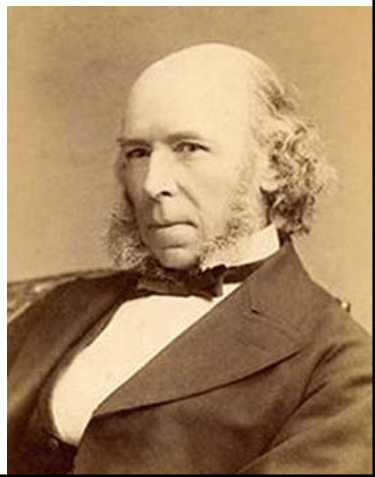
So what now?

- **Vitamine A**
  - ADH 700-1000 IU
  - Upper limit of intake 3000 IU

Limitations: **High-dosage (≥400 IU/d) trials were often small and were performed in patients with chronic diseases. The generalizability of the findings to healthy adults is uncertain. Precise estimation of the threshold at which risk increases is difficult.**

Take home message No. 11:

Er is wetenschappelijk bewijs tegen het gebruik van vitamine A en vitamine E suppletie



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Bron: Kuipers, Oerdieet

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

The habitual micronutrient intake of Dutch adults (VCP 2007-2010) compared with dietary reference values set by the Health Council of the Netherlands (2014) and EFSA (2010-2017)

3.15 Magnesium

Table 34. The distribution (95%-CI) of habitual magnesium intake in Dutch adults aged 19-50 years (DNFCS 2007-2010).

	Habitual intake distribution magnesium (mg/d)					
	mean	**P5**	**P25**	**P50**	**P75**	**P95**
men	396 (390-406)	268 (259-278)	337 (330-346)	391 (384-400)	450 (442-461)	545 (532-562)
women	308 (301-314)	214 (207-221)	265 (258-271)	304 (297-310)	347 (338-354)	415 (402-426)

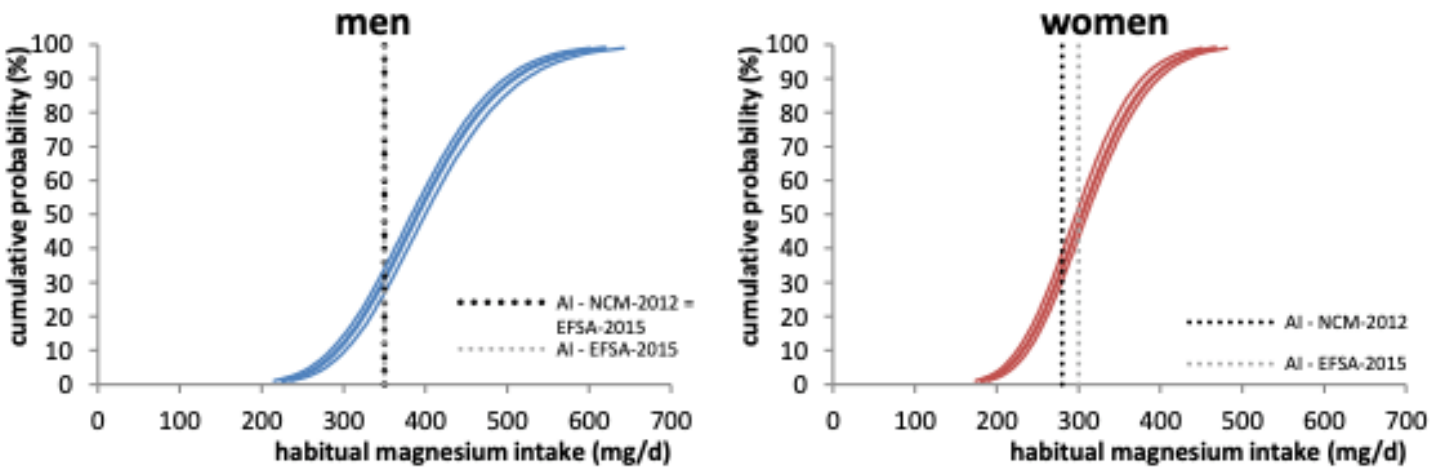


Figure 15. Habitual magnesium intake distribution for Dutch adult men (blue) and women (red) aged 19-50 years (DNFCS 2007-2010) in comparison with the ad interim Dutch or EFSA DRV.

Maximum RDA = 350 mg voor vrouwen en 420 mg voor mannen

Proceedings of the National Academy of Sciences
Vol. 66, No. 3, pp. 869–873, July 1970

Roger Romani† and Anna Monadjem

DEPARTMENT OF POMOLOGY, UNIVERSITY OF CALIFORNIA (DAVIS)

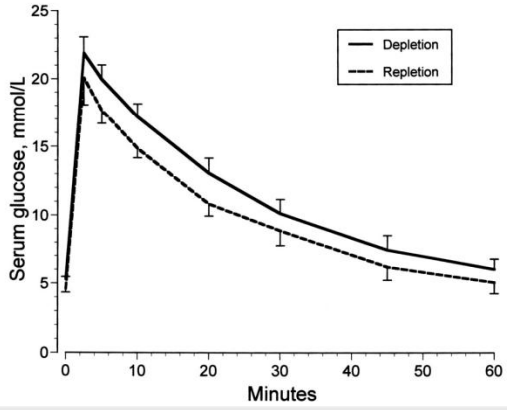
Mitochondrial Longevity *In Vitro*: The Retention of Respiratory Control*

Longevity is a dynamic function as evidenced by its dependency on substrate and cofactors, thiamine pyrophosphate, in particular. Magnesium was also essential to longevity;

Dietary Magnesium Deficiency Induces Heart Rhythm Changes, Impairs Glucose Tolerance, and Decreases Serum Cholesterol in Post Menopausal Women

Forrest H. Nielsen, PhD, David B. Milne, PhD, Leslie M. Klevay*, MD, Sandra Gallagher, BS, and LuAnn Johnson, MS**

Results: During magnesium depletion, heart rhythm changes appeared in 5 women and resulted in 4 prematurely entering the magnesium repletion period (42 to 64 days of depletion instead of 78). Three women exhibited atrial fibrillation and flutter that responded quickly to magnesium supplementation.

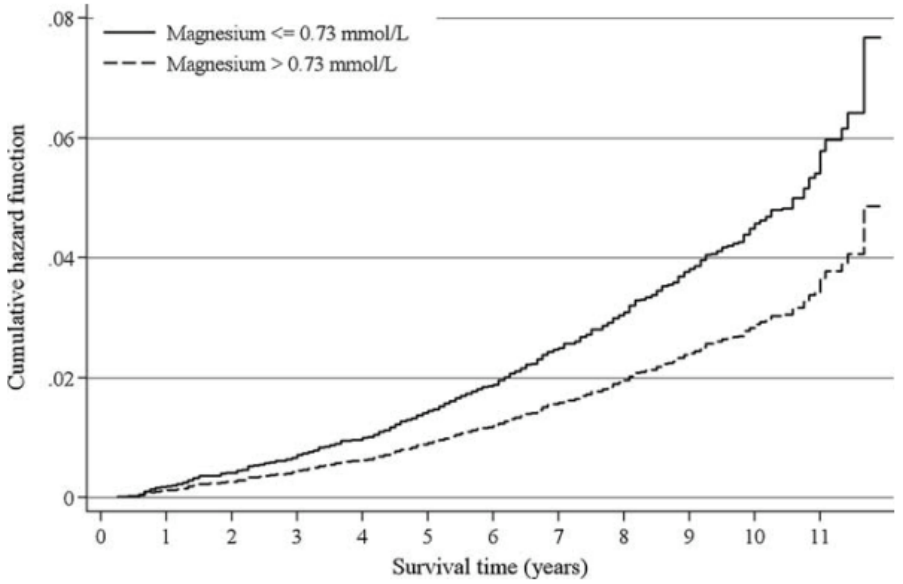


Journal of the American College of Nutrition, Vol. 26, No. 2, 121–132 (2007)

Low serum magnesium concentrations predict cardiovascular and all-cause mortality

Thorsten Reffelmann[a,*], Till Ittermann[b,c], Marcu
Astrid Petersmann[c], Stephan B. Felix[a]

Atherosclerosis 219 (2011) 280–284



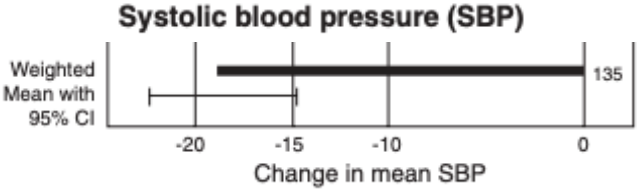
Oral magnesium supplements decrease high blood pressure (SBP > 155 mmHg) in hypertensive subjects on anti-hypertensive medications: a targeted meta-analysis

Andrea Rosanoff, Michael R. Plesset
Center for Magnesium Education & Research, 13-1255 Malama St., Pahoa, HI 96778 USA

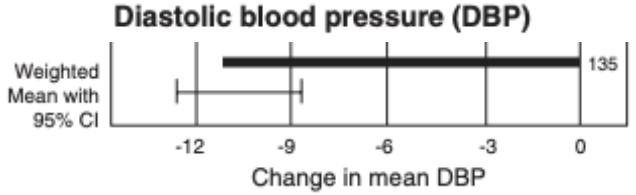
Mean drop in SBP: -18.7 mm Hg

Mean drop in DBP: -10.9 mm Hg

Mg is 'nature's physiological calcium blocker'



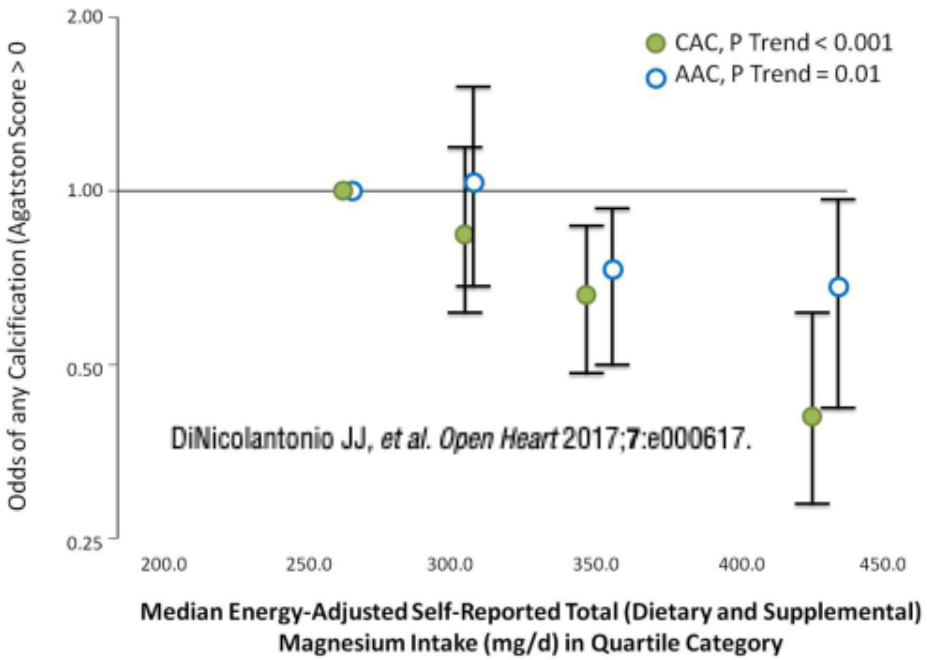
References



Magnesium Research 2013; **26** (3): 93-9

Decreased magnesium status may mediate the increased cardiovascular risk associated with calcium supplementation

James J DiNicolantonio,[1] Mark F McCarty,[2] James H O'Keefe[1]



Dietary Magnesium and Kidney Function Decline: The Healthy Aging in Neighborhoods of Diversity across the Life Span Study

Casey M. Rebholz[a, b] Adrienne Tin[a, b] Yang Liu[c] Marie Fanelli Kuczmarski[e]
Michele K. Evans[d] Alan B. Zonderman[d] Deidra C. Crews[b, c]

Table 2. Odds[a] of rapid kidney function decline (≥3% eGFR decline/year) by tertile of dietary intake of magnesium

Model	Tertile of dietary intake of magnesium			p value for trend
	tertile 1	tertile 2	tertile 3	
Model 1	1.80 (1.22–2.64)	1.05 (0.69–1.60)	1 (reference)	0.002
Model 2	1.83 (1.20–2.81)	1.04 (0.67–1.61)	1 (reference)	0.003
Model 3	1.80 (1.17–2.77)	1.05 (0.68–1.64)	1 (reference)	0.005
Model 4	2.02 (1.05–3.86)	1.07 (0.62–1.84)	1 (reference)	0.02

Dietary data suggest that the average magnesium intake has declined markedly over the last 100 years.

Am J Nephrol 2016;44:381–387

Referentiewaarde Mg volwassenen: **0.7-1.0 mmol/l.**

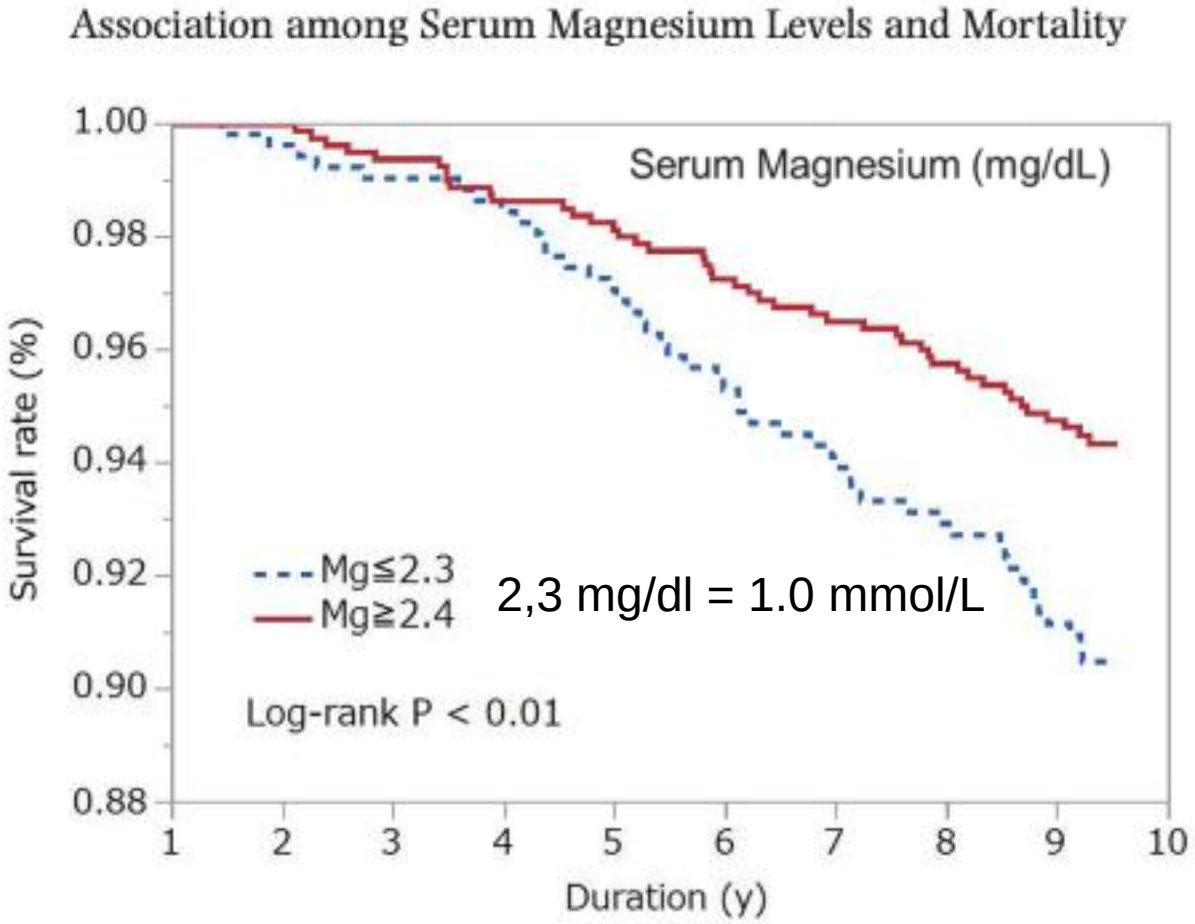


Fig. 2. Ten-year all-cause mortality rates according to serum magnesium levels.

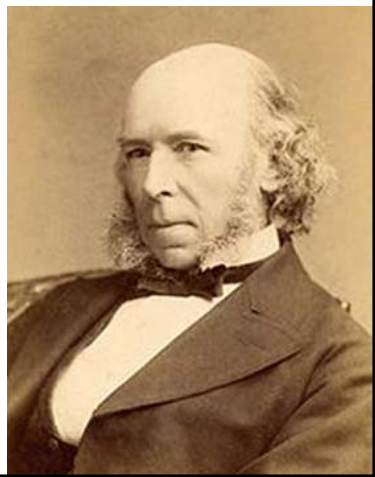
J Nutr Sci Vitaminol, **68**, 270–275, 2022

Take home message No. 12:

Magnesium lijkt een bewezen effectief supplement t.a.v. bloeddruk, insulinegevoeligheid, CV-risico en mortaliteit

referentiewaarde mogelijk te ‘laag’

-streef > 0.85-



Wat eten mensen gemiddeld?

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Jodium	150 ug	<10*
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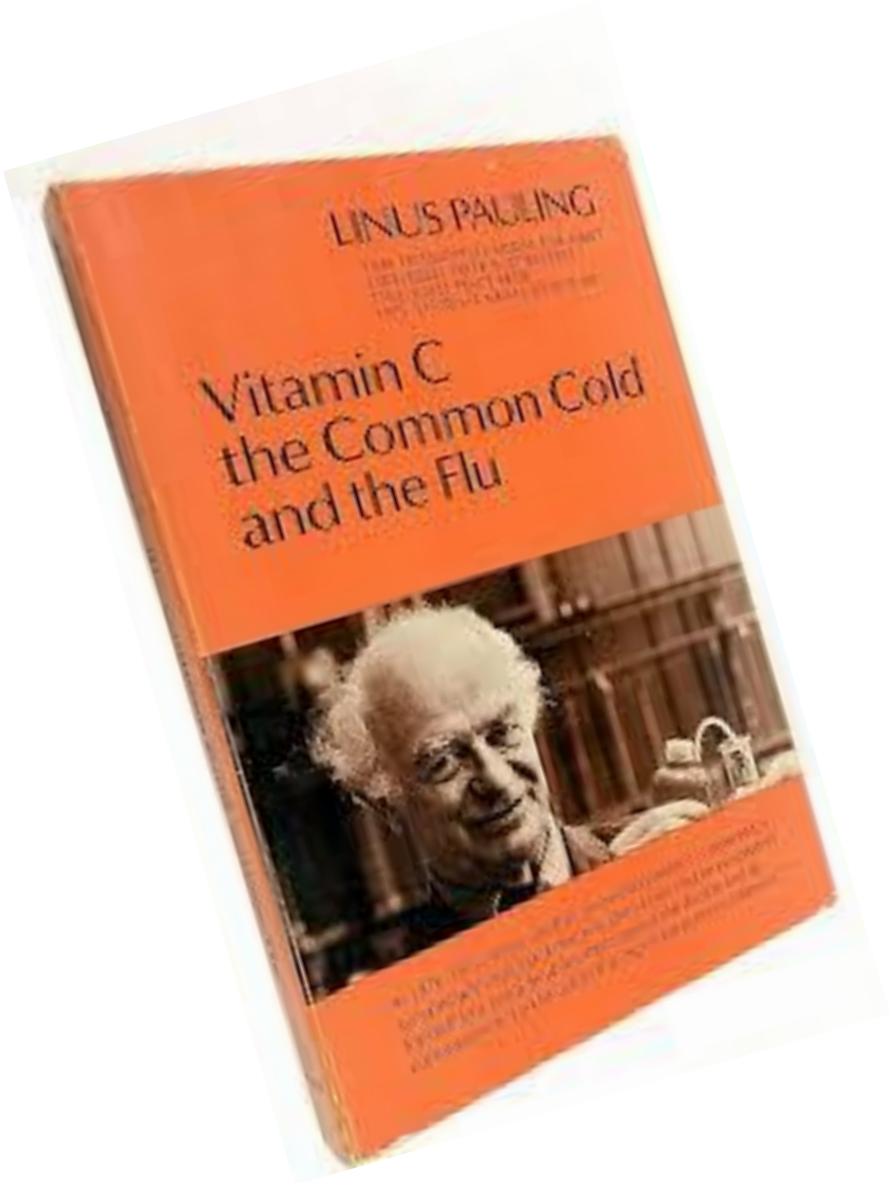
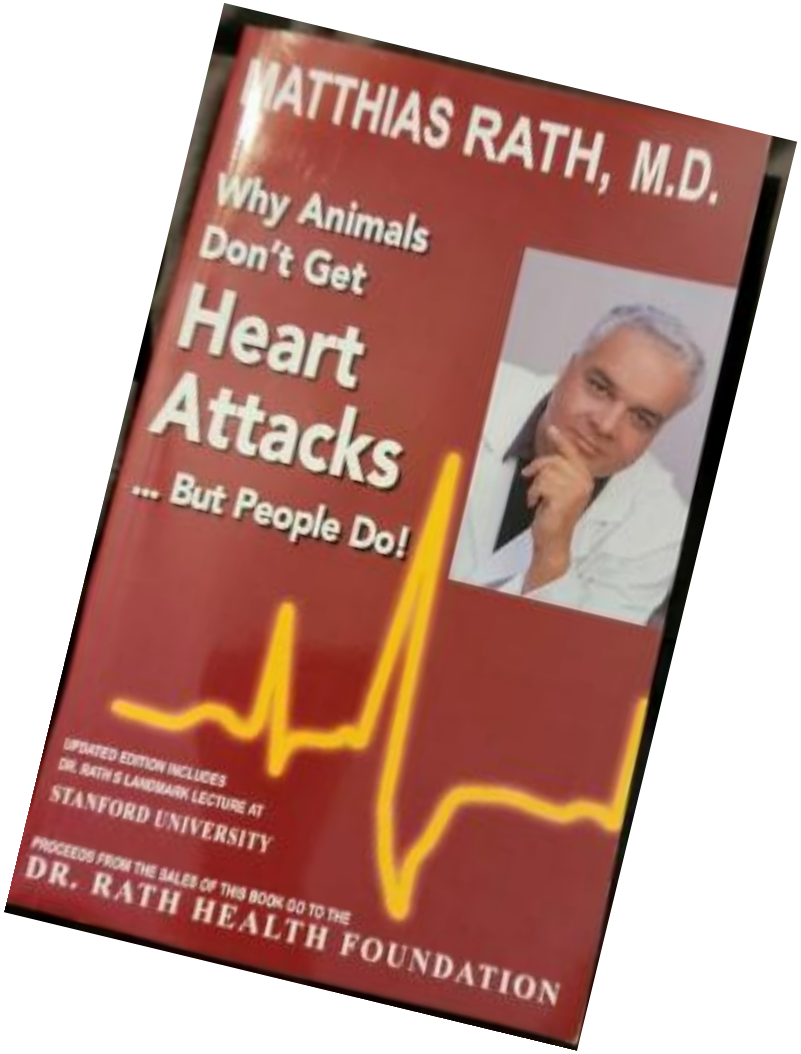
* Indien het gebruik van gejodeerd zout (o.a. in brood) niet wordt meegerekend

Bron: Kuipers, Oerdieet

Vitamine C


LINUS PAULING
Vitamin C
the Common Cold
and the Flu

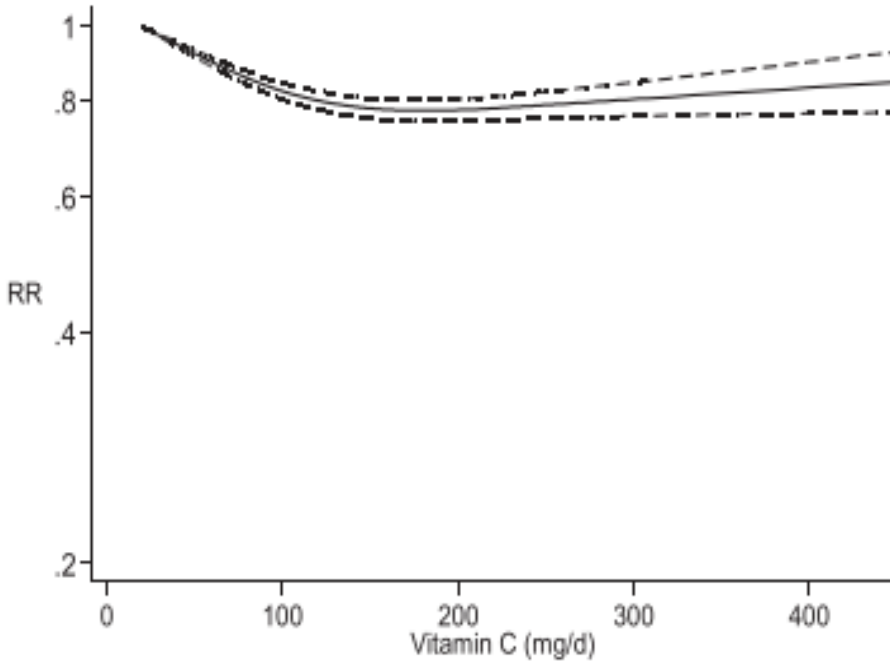

MATTHIAS RATH, M.D.
Why Animals
Don't Get
Heart
Attacks
... But People Do!
UPDATED EDITION INCLUDES
DR. RATH'S LANDMARK LECTURE AT
STANFORD UNIVERSITY
PROCEEDS FROM THE SALES OF THIS BOOK GO TO THE
DR. RATH HEALTH FOUNDATION

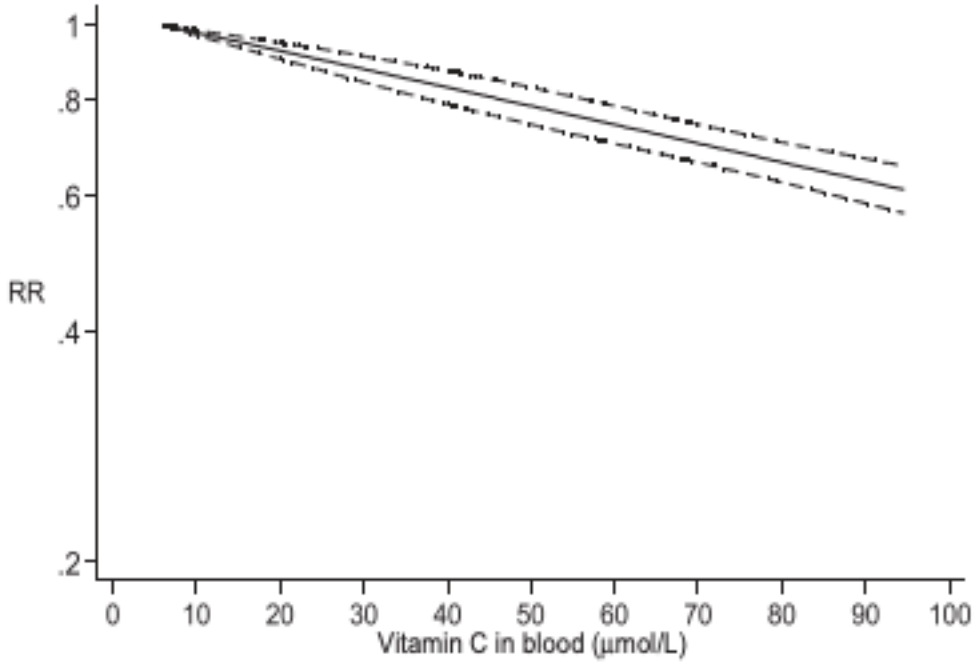
Dietary intake and blood concentrations of antioxidants and the risk of cardiovascular disease, total cancer, and all-cause mortality: a systematic review and dose-response meta-analysis of prospective studies

Am J Clin Nutr 2018;108:1069–1091.

Dagfinn Aune,[1,2,3,4] NaNa Keum,[5] Edward Giovannucci,[5,6,7] Lars T Fadnes,[8,9,10] Paolo Boffetta,[11] Darren C Greenwood,[12] Serena Tonstad,[4] Lars J Vatten,[1] Elio Riboli,[2] and Teresa Norat[2]

Dietary intake and blood concentrations of vitamin C and mortality: dose-response analyses.



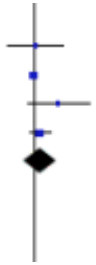


Systematic Review

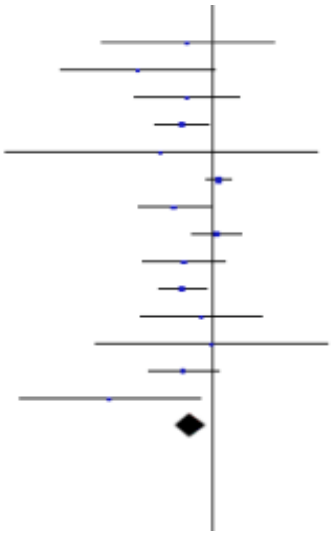
Association of Oral or Intravenous Vitamin C Supplementation with Mortality: A Systematic Review and Meta-Analysis

Chongxi Xu [1], Tong Yi [2], Siwen Tan [3], Hui Xu [4], Yu Hu [1], Junpeng Ma [1,†] and Jianguo Xu [1,*,†]

1.1.5 Cancer mortality						
C G Moertel [1985]	24	49	24	51	4.4%	1.04 [0.69, 1.57]
Creagan ET [1979]	60	60	62	63	13.6%	1.02 [0.97, 1.06]
Gaziano JM [2009]	45	7329	31	7312	3.8%	1.45 [0.92, 2.29]
Lin J [2009]	329	3824	295	3803	10.8%	1.11 [0.95, 1.29]
Subtotal (95% CI)		**11262**		**11229**	**32.6%**	**1.11 [0.87, 1.41]**
Total events	458		412			
Heterogeneity: Tau² = 0.04; Chi² = 19.09, df = 3 (P = 0.0003); I² = 84%						
Test for overall effect: Z = 0.84 (P = 0.40)						

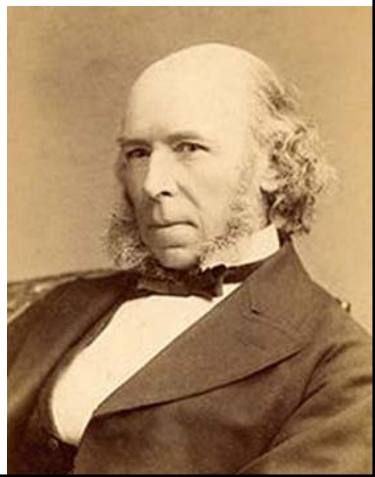


1.1.1 Sepsis mortality						
Aisa-Alvarez A [2020]	3	18	5	21	0.6%	0.70 [0.19, 2.53]
El Driny WA [2022]	3	20	9	20	0.8%	0.33 [0.11, 1.05]
Fowler AA 3rd [2014]	7	16	5	8	1.6%	0.70 [0.32, 1.52]
Fowler AA 3rd [2019]	25	84	38	82	4.5%	0.64 [0.43, 0.96]
Gayathri Ranie Ap [2022]	1	19	2	18	0.2%	0.47 [0.05, 4.78]
Lamontagne F [2022]	152	429	137	434	9.6%	1.12 [0.93, 1.36]
Lv SJ [2021]	15	61	24	56	3.0%	0.57 [0.34, 0.98]
Mohamed ZU [2020]	26	45	23	43	5.0%	1.08 [0.74, 1.57]
Nabil Habib T [2017]	12	50	18	50	2.4%	0.67 [0.36, 1.23]
Niu JJ [2019]	34	122	48	112	5.3%	0.65 [0.46, 0.93]
P Rosengrave [2022]	6	20	7	20	1.2%	0.86 [0.35, 2.10]
Reddy [2020]	2	9	2	9	0.4%	1.00 [0.18, 5.63]
Wacker DA [2022]	16	60	26	64	3.2%	0.66 [0.39, 1.10]
Zabet MH [2016]	2	14	9	14	0.6%	0.22 [0.06, 0.85]
Subtotal (95% CI)		**967**		**951**	**38.3%**	**0.74 [0.59, 0.91]**
Total events	304		353			
Heterogeneity: Tau² = 0.06; Chi² = 24.70, df = 13 (P = 0.03); I² = 47%						
Test for overall effect: Z = 2.78 (P = 0.005)						



Take home message No. 13:

Vitamine C suppletie heeft een bewezen effect t.a.v. mortaliteit door infecties



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Bron: Kuipers, Oerdieet

Zinc Supplementation in Individuals with Prediabetes and type 2 Diabetes: a GRADE-Assessed Systematic Review and Dose-Response Meta-analysis

Review > Biol Trace Elem Res. 2024 Jul;202(7):2966-2990.

Of the 4004 initial records, 23 studies that met inclusion criteria were analyzed in this meta-analysis. The pooled findings indicated the significant lowering effects of zinc supplementation on triglycerides (TG), total cholesterol (TC), fasting blood glucose (FBG), hemoglobin A1C (HbA1C), and C-reactive protein (CRP), while high-density cholesterol (HDL) concentrations showed an elevation after zinc supplementation.

Our study demonstrated that zinc supplementation has beneficial effects on glycemic control markers, lipid profile, and CRP levels as a classic marker of inflammation in T2DM.

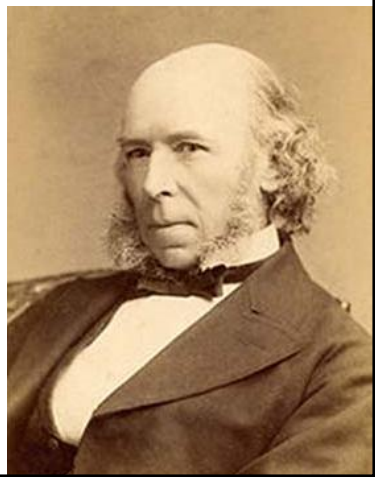
Review > Eur J Med Res. 2022 May 23;27(1):70. doi: 10.1186/s40001-022-00694-z.

Zinc supplementation and COVID-19 mortality: a meta-analysis

The meta-analysis showed that zinc supplementation in cases led to a significant lower risk of mortality when it was compared with the control group; pooled OR (95% CI) was 0.57 [0.43, 0.77] ($P < 0.001$).

Take home message No. 14:

Zink suppletie heeft een bewezen effect t.a.v. insulinegevoeligheid en mortaliteit door infecties



Verdieping 1

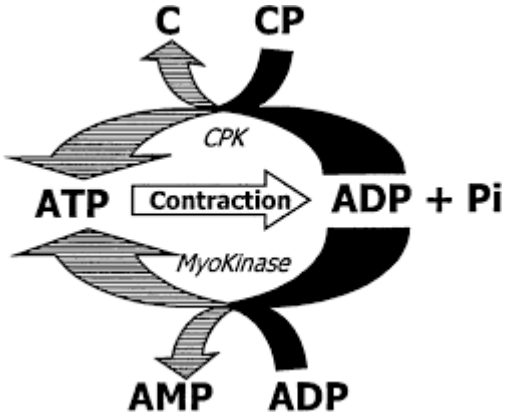
Energie

Waar komt energie vandaan?

Back to Basics – Understanding Energie

De mens kent **verschillende** manieren voor energievoorziening

- **Het ATP-CP systeem: Ultra kort/direct (10-30 seconden)**
  - Energie leverancier: ATP opgeslagen in spierweefsel
    - ATP -> ADP + P
  - Regeneratie optie 1 van ATP: Creatininephosphaat (CP)
    - CP (oiv creatine kinase) -> creatine + Pi (=energie)
  - Regeneratie optie 2 van ATP: ADP
    - ADP (oiv myoninase) -> AMP + Pi
  - Energie + ADP + P -> ATP
    - ATP -> ADP + P, etc

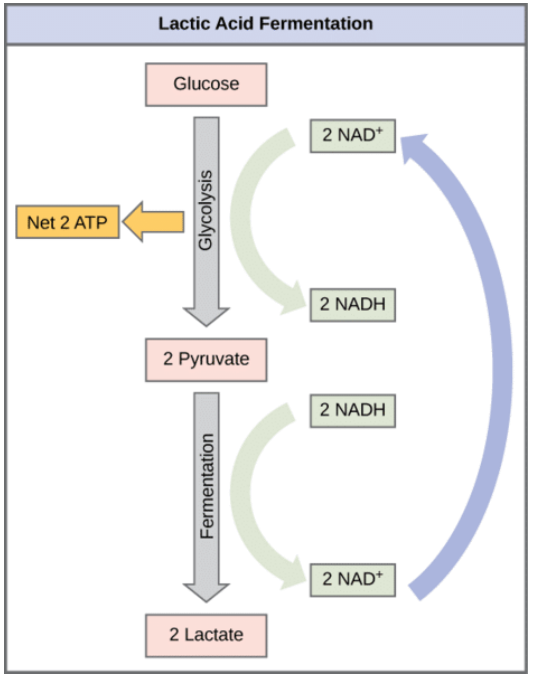


  - Bovenstaande processen lopen tot alle CP ‘op’ is
    - na ongeveer 10-30 seconden
    - Recovery van het ATP-CP is zeer snel (in 3-5 minuten)

Back to Basics – Understanding Energie

De mens kent **verschillende** manieren voor energievoorziening

- **Anaerobe respiratie: Kort (1-3 minuten):**
  - Anaerobe (zonder zuurstof) respiratie
  - Glycolyse
    - Glucose afgebroken tot 2 pyruvaat
    - Generatie van 2 ATP (en 2 NADH)
    - Verbruik 2 NAD+
  - Fermentatie
    - Pyruvaat afgebroken tot lactaat (melkzuur)
    - NADH gerecycled tot NAD+ voor behoud glycolyse

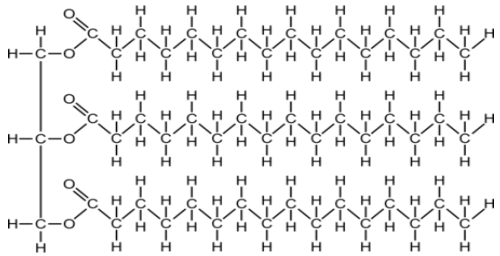


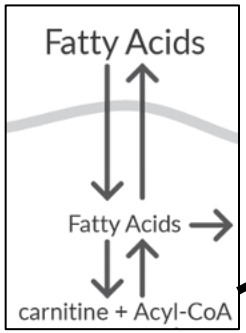
  - Reactie beperkt door stapeling van lactaat / verzuring

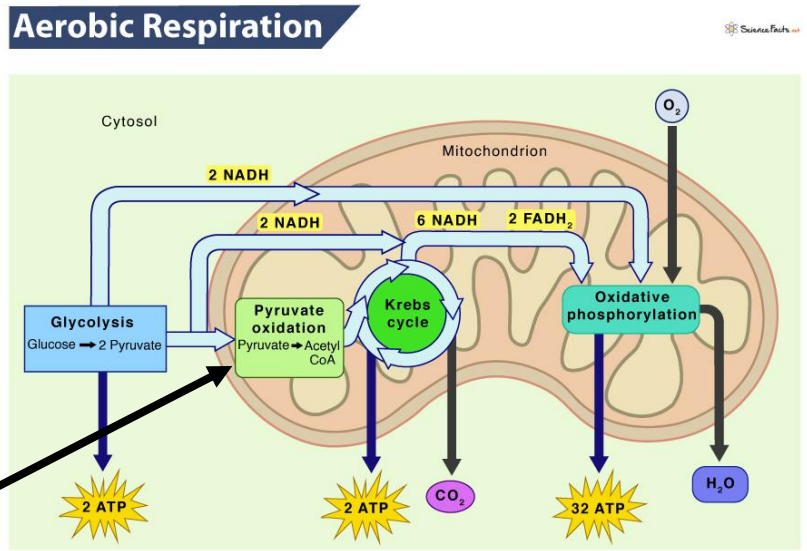
Back to Basics – Understanding Energie

De mens kent **verschillende** manieren voor energievoorziening

- **Aerobe respiratie: langdurig (uren tot dagen)**
  - Zowel mogelijk met **koolhydraten, vetten** en eiwit (en zelfs alcohol)
    - 1 molecuul glucose levert 2 Acetyl CoA
      - » 36 ATP
    - 1 molecuul vet levert
      - » 1 triglyceride = 1 Acetyl CoA
      - » 3 vetzuren (van gemiddeld 18 C-atomen)
        - 3 x 18/3 = 18 Acetyl CoA
      - » 19 (18+1) x 34 = 646 ATP…

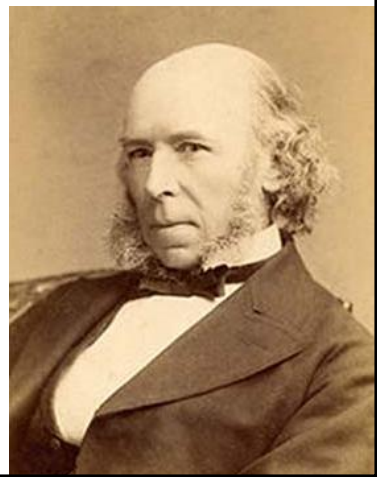




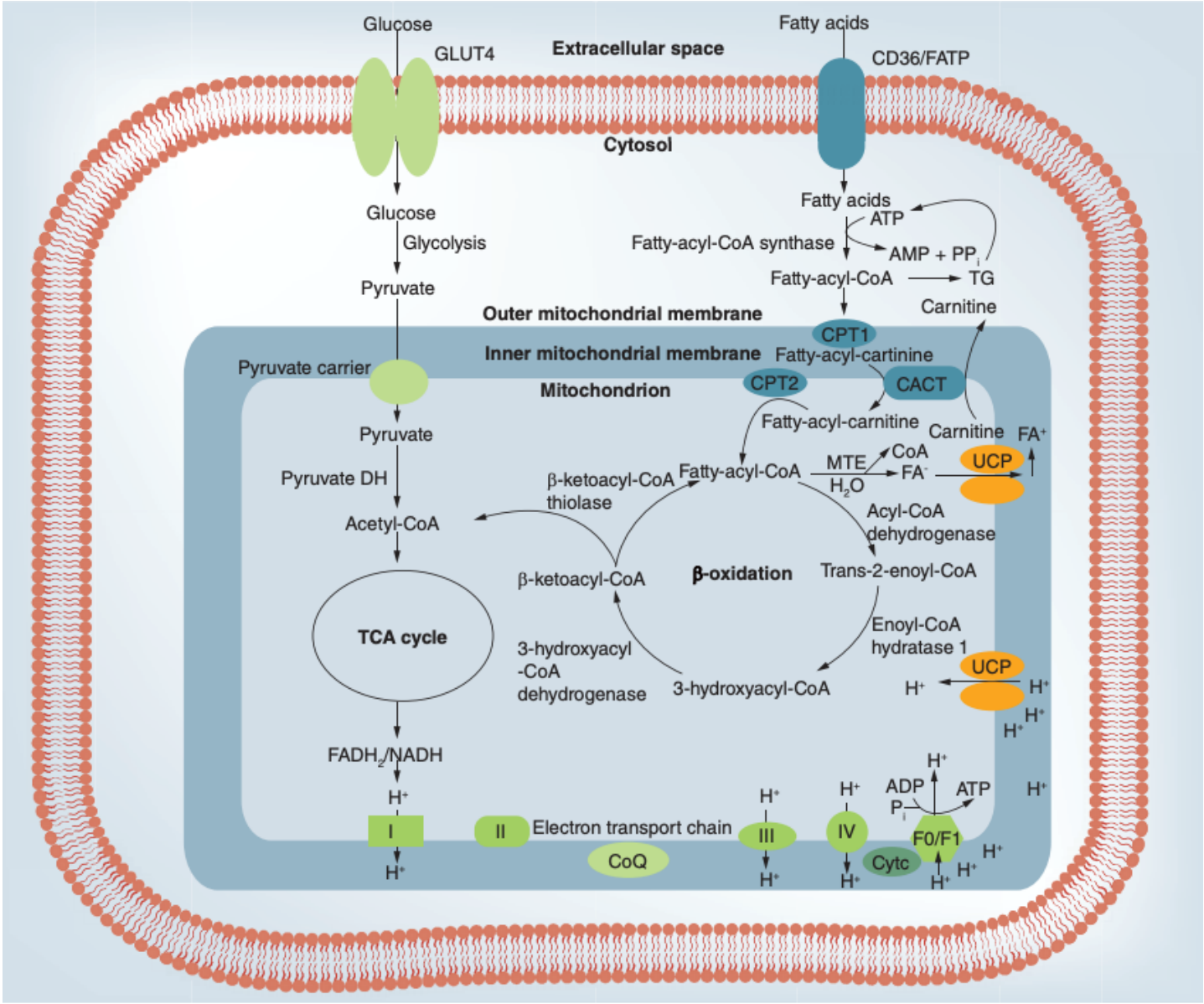


Take home message No. 15:

Energie generatie vindt vnl plaats in de mitochondria en levert onder aerobe omstandigheden 36 ATP, onder anaerobe omstandigheden 2 ATP, en vaak iets daartussen

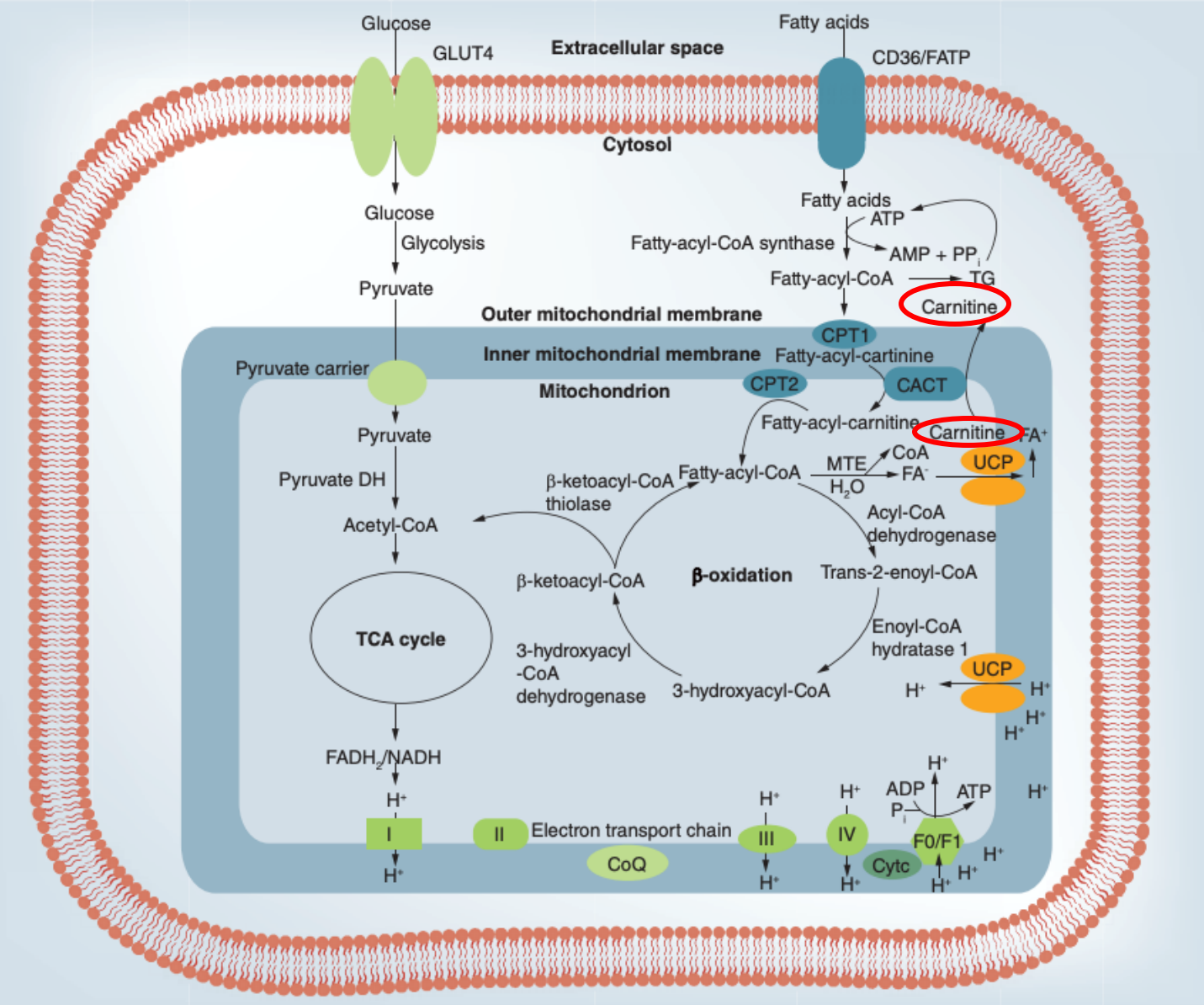


Where does energy generation take place?



Muthuramu et al. Clinical lipidology 2015

Mitochondrial Energy Problems



Muthuramu et al. Clinical lipidology 2015

Grünert et al. Orphanet Journal of Rare Diseases (2020) 15:87
https://doi.org/10.1186/s13023-020-01371-2

Carnitine deficiency

Orphanet Journal of Rare Diseases

RESEARCH Open Access

Primary carnitine deficiency – diagnosis after heart transplantation: better late than never!

1:100.000

Sarah C. Grünert[1*], Sara Tucci[1], Anke Schumann[1], Meike Schwendt[2], Gwendolyn Gramer[3], Georg F. Hoffmann[3], Michelle Erbel[4], Brigitte Stiller[2] and Ute Spiekerkoetter[1]

Grünert et al. Orphanet Journal of Rare Diseases (2020) 15:87
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Myocardial Function, Energy Provision, and Carnitine Deficiency in Experimental Uremia

J Am Soc Nephrol 18: 84–92, 2007. doi: 10.1681/ASN.2005080876

Veena Reddy,* Sunil Bhandari,† and Anne-Marie L. Seymour*

**Department of Biological Sciences, University of Hull, Hull, and †Department of Renal Medicine, Hull and East Yorkshire Hospital NHS Trust, Kingston-upon-Hull, United Kingdom*

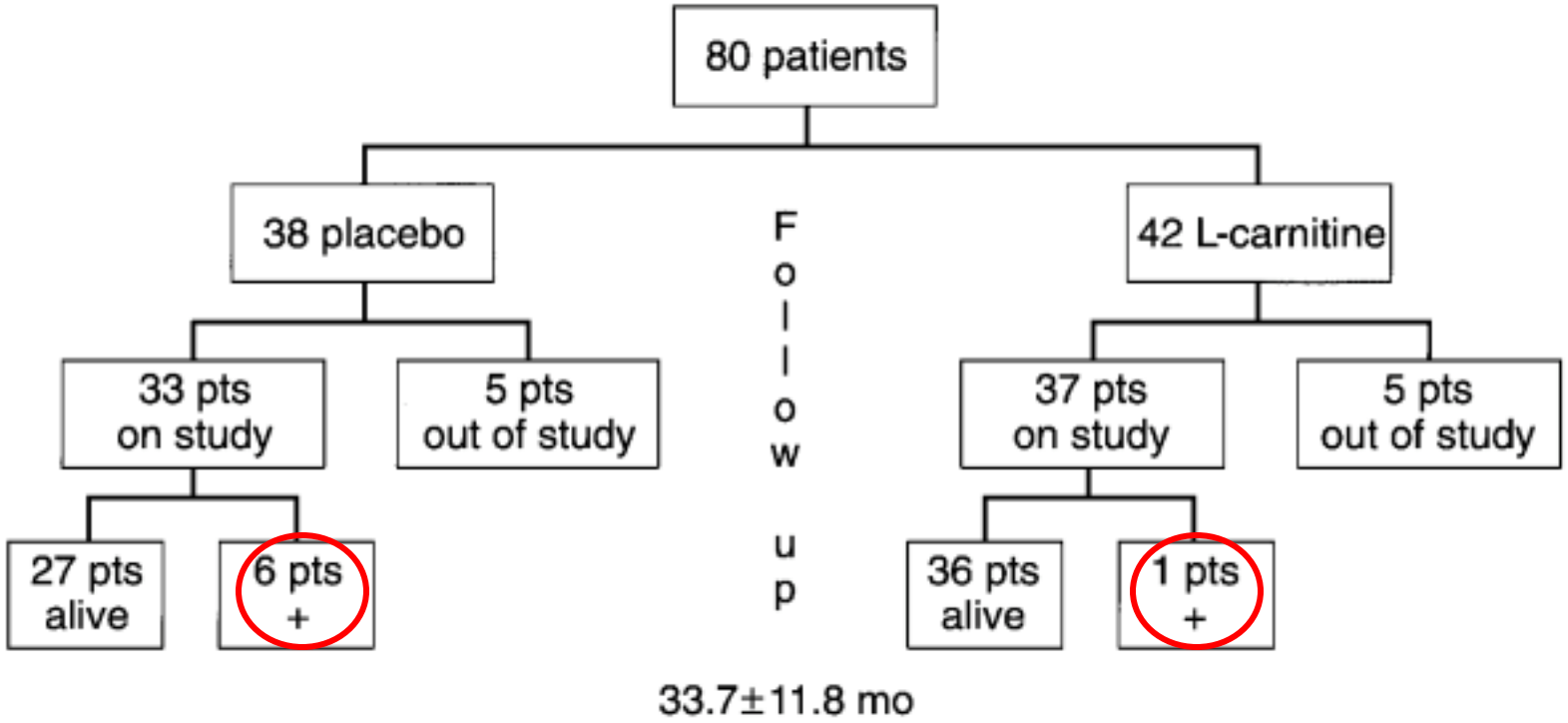
Secondary carnitine deficiency frequently is seen in uremic patients, particularly in those who are on maintenance hemodialysis therapy

Three-year survival of patients with heart failure caused by dilated cardiomyopathy and L-carnitine administration

Ioannis Rizos, MD *Athens, Greece*

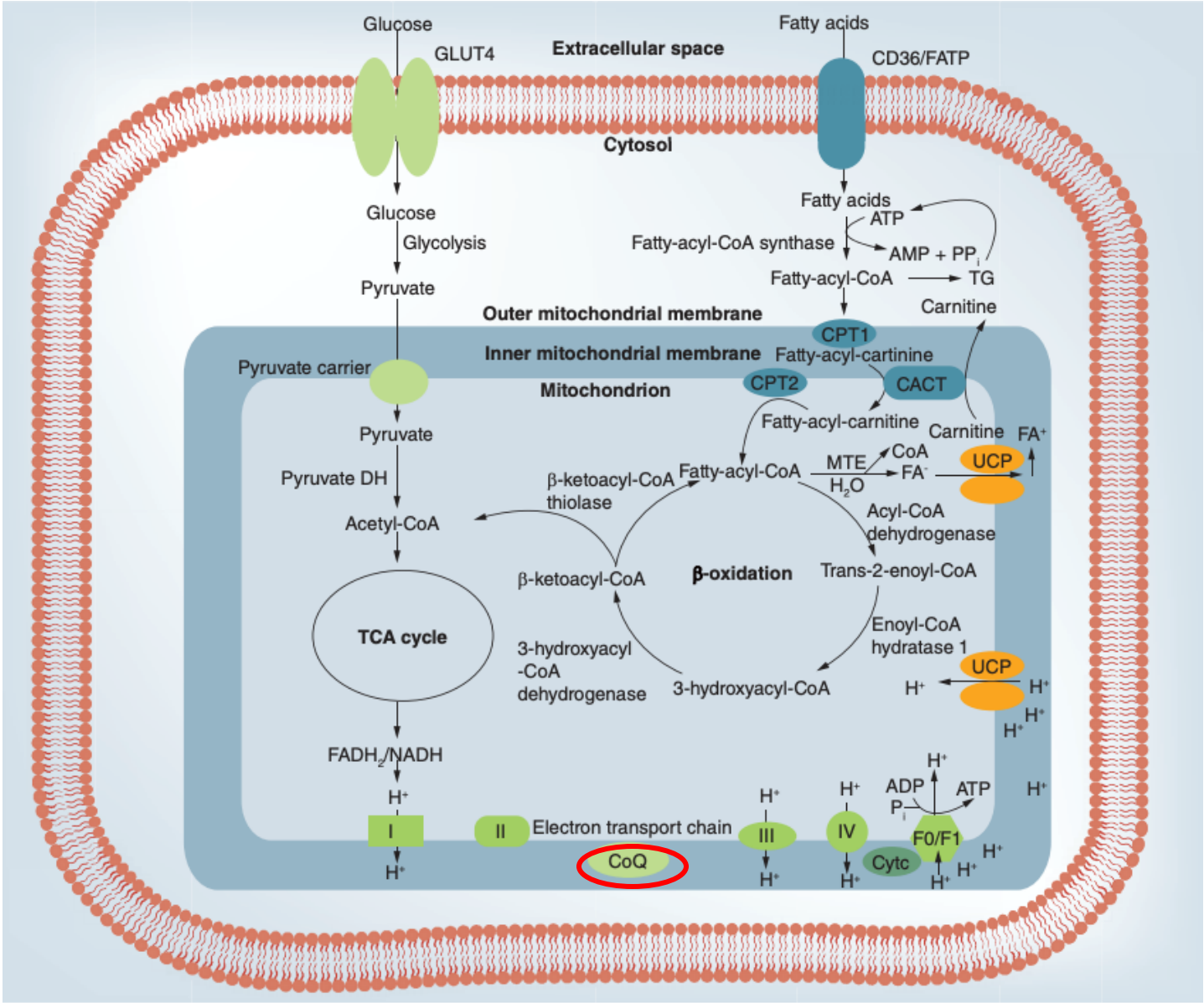
. (Am Heart J 2000;139:S120-S123.)

Figure 2



Disposition of patients at 3-year follow-up; +, death.

Mitochondrial Energy Problems



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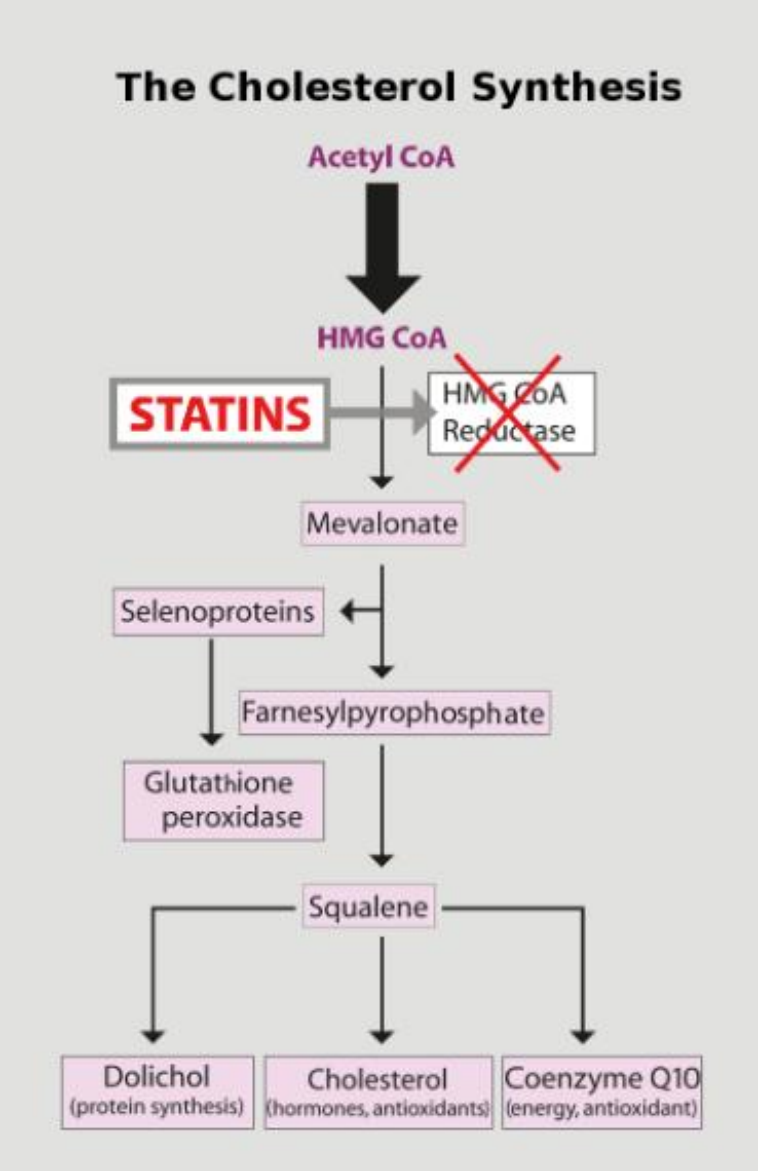
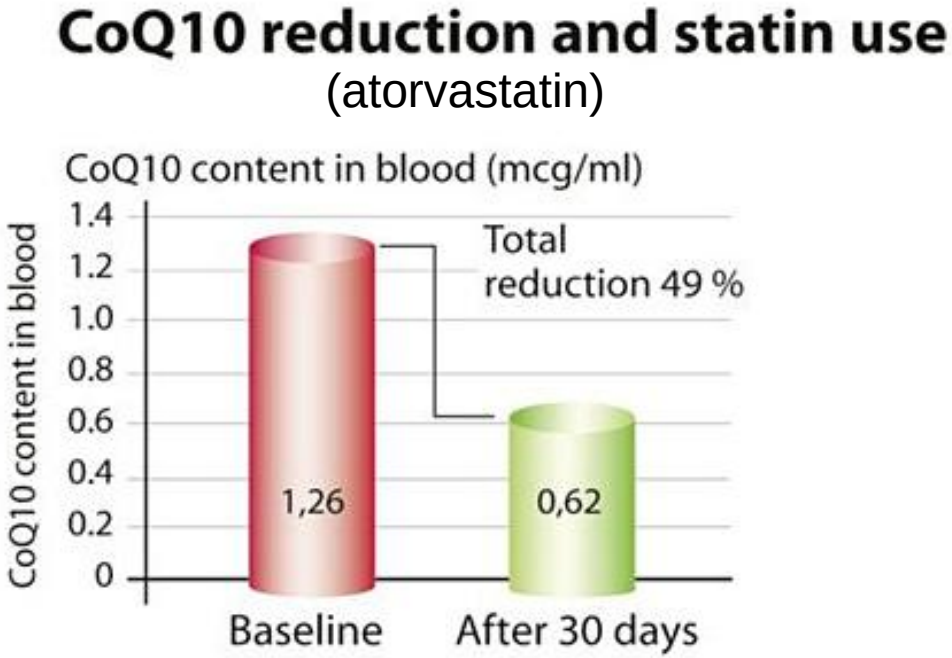
Een link met statines





Arch neurol 2004 Jun;61(6):889-

Pharmacological Research 99 (2015) 329–336

Contents lists available at ScienceDirect

Pharmacological Research

journal homepage: www.elsevier.com/locate/yphrs

Statin therapy and plasma coenzyme Q10 concentrations—A systematic review and meta-analysis of placebo-controlled trials

Maciej Banach[a,*,1], Corina Serban[b,1], Sorin Ursoniu[c], Jacek Rysz[d], Paul Muntner[e], Peter P. Toth[f,g], Steven R. Jones[g], Manfredi Rizzo[h], Stephen P. Glasser[i], Gerald F. Watts[j], Roger S. Blumenthal[g], Gregory Y.H. Lip[k], Dimitri P. Mikhailidis[l], Amirhossein Sahebkar[m], Lipid and Blood Pressure Meta-analysis Collaboration (LBPMC) Group

Group by Statin type	Study name	Difference in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Atorvastatin	Paiva et al., 2005b	-0.530	0.093	0.009	-0.713	-0.347	-5.680	0.000
Atorvastatin	Oranje et al., 2001	-0.270	0.103	0.011	-0.472	-0.068	-2.615	0.009
Atorvastatin	Strey et al., 2005	-0.390	0.151	0.023	-0.685	-0.095	-2.591	0.010
Atorvastatin		-0.409	0.063	0.004	-0.532	-0.286	-6.504	0.000
Pravastatin	Ghirlanda et al., 1993a	-0.430	0.135	0.018	-0.695	-0.165	-3.185	0.001
Pravastatin		-0.430	0.135	0.018	-0.695	-0.165	-3.185	0.001
Rosuvastatin	Ashton et al., 2011	-0.490	0.090	0.008	-0.667	-0.313	-5.423	0.000
Rosuvastatin		-0.490	0.090	0.008	-0.667	-0.313	-5.423	0.000
Simvastatin	Paiva et al., 2005a	-0.550	0.105	0.011	-0.756	-0.344	-5.235	0.000
Simvastatin	Jula et al., 2002	-0.320	0.424	0.180	-1.152	0.512	-0.754	0.451
Simvastatin	Ghirlanda et al., 1993b	-0.400	0.100	0.010	-0.595	-0.205	-4.015	0.000
Simvastatin		-0.467	0.071	0.005	-0.608	-0.327	-6.550	0.000

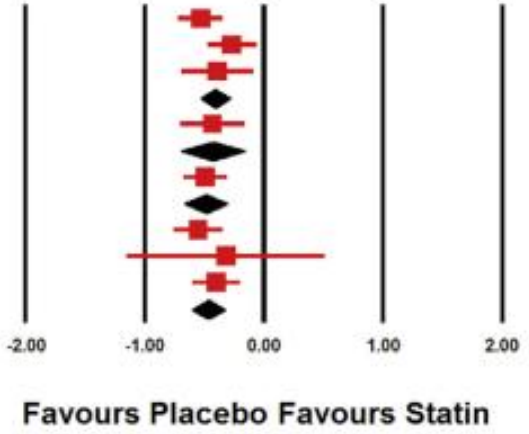


Fig. 3. Forest plot displaying weighted mean difference and 95% confidence intervals for the impact of different statins on plasma CoQ10 concentrations.

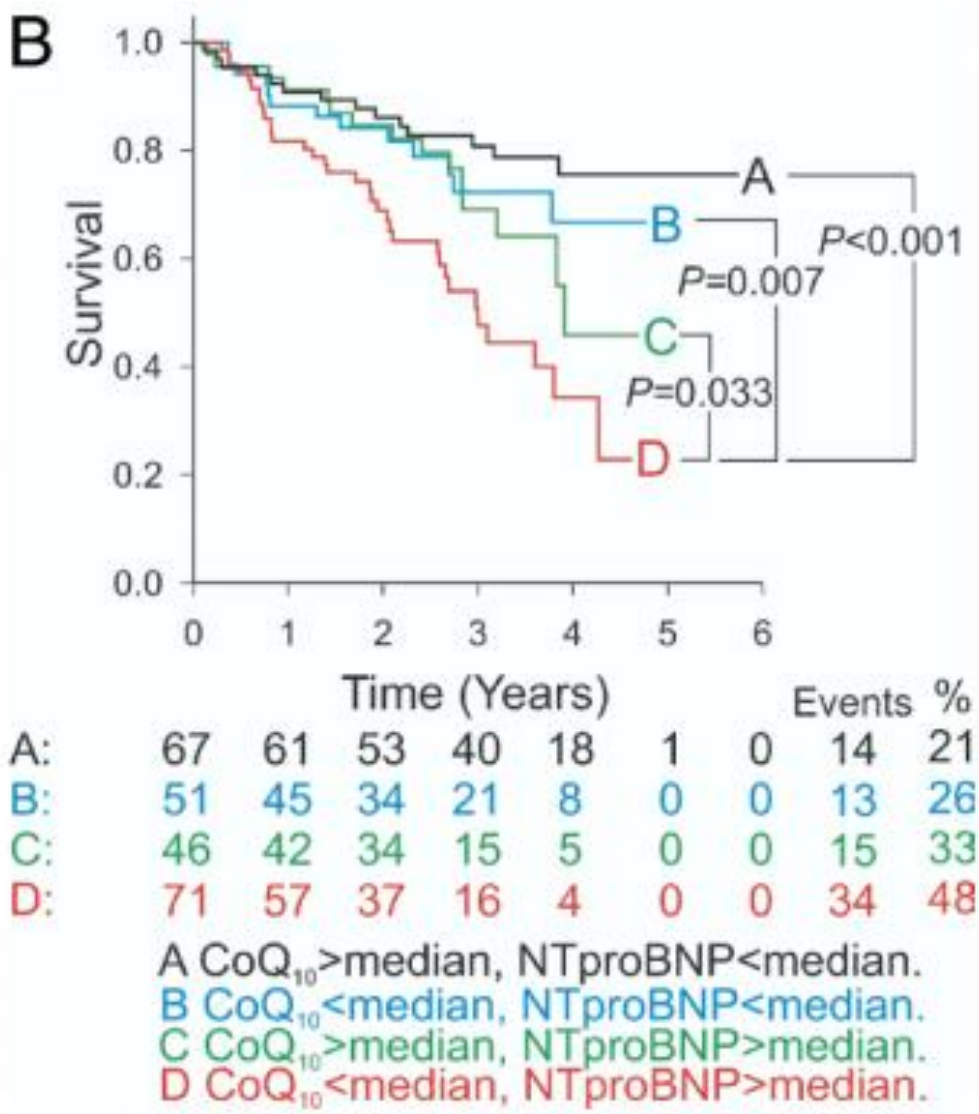


Figure 2 **Survival Related to CoQ_{10} Concentration and to CoQ_{10} and NT-proBNP 4-Way Split**

Conclusions

Plasma CoQ_{10} is an independent predictor of mortality in CHF. CoQ_{10} deficiency might be implicated in the long-term prognosis of CHF, and there is a rationale for further controlled intervention studies of CoQ_{10} supplementation.

Molyneux et al. Coenzym Q10 and independent predictor of artality in chronic heart failure, JAC

Lei and Liu *BMC Cardiovascular Disorders* (2017) 17:196
DOI 10.1186/s12872-017-0628-9

BMC Cardiovascular Disorders

RESEARCH ARTICLE Open Access

Efficacy of coenzyme Q10 in patients with cardiac failure: a meta-analysis of clinical trials

Li Lei[1] and Yan Liu[2*]

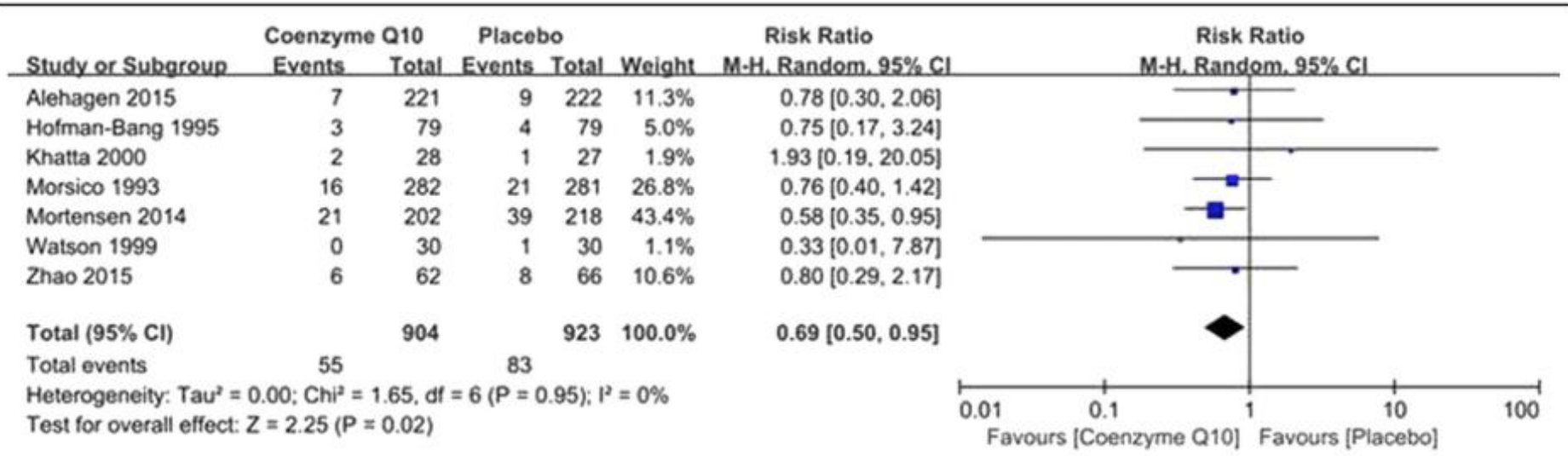


Fig. 2 Forest plot of mortality

Lei and Liu *BMC Cardiovascular Disorders*
DOI 10.1186/s12872-017-0628-9

RESEARCH ARTICLE

Efficacy of coe cardiac failure trials

Li Lei[1] and Yan Liu[2*]

Table. Demonstrated Benefits of Evidence-Based Therapies for Patients With Heart Failure and Reduced Ejection Fraction

Evidence-Based Therapy	Relative Risk Reduction in All-Cause Mortality in Pivotal Randomized Clinical Trial(s), %	NNT to Prevent All-Cause Mortality Over Time	NNT for All-Cause Mortality[a]
ACEI/ARB	17	22 over 42 mo	77
ARNI[b]	16	36 over 27 mo	80
β-Blocker	34	28 over 12 mo	28
Aldosterone antagonist	30	9 over 24 mo	18
Hydralazine/ nitrate	43	25 over 10 mo	21
CRT	36	12 over 24 mo	24
ICD	23	14 over 60 mo	70

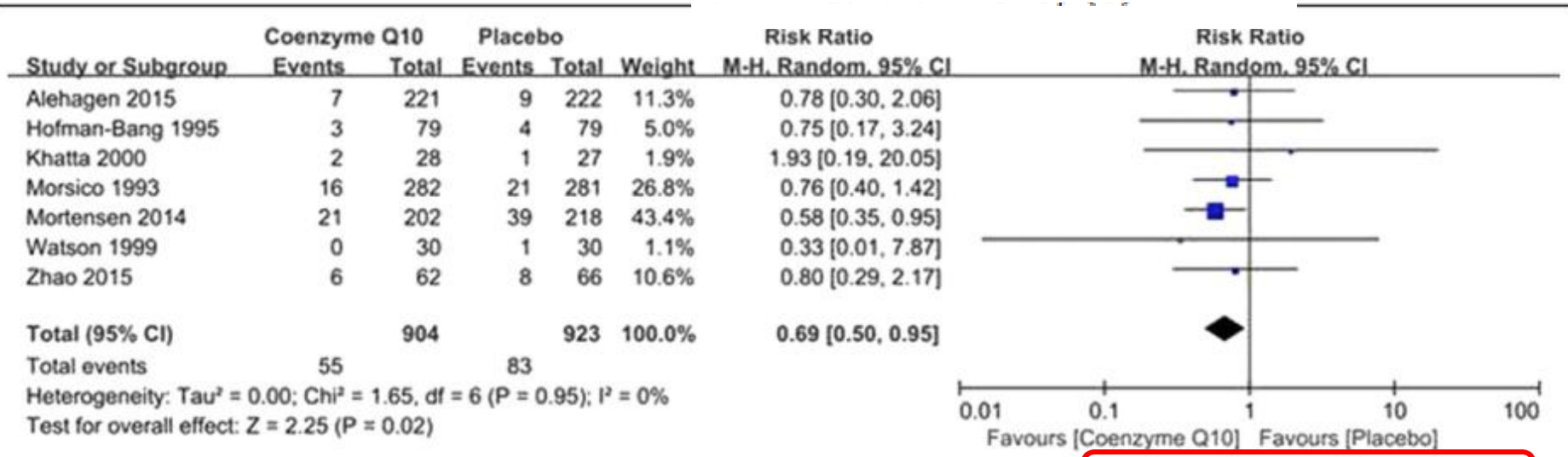


Fig. 2 Forest plot of mortality

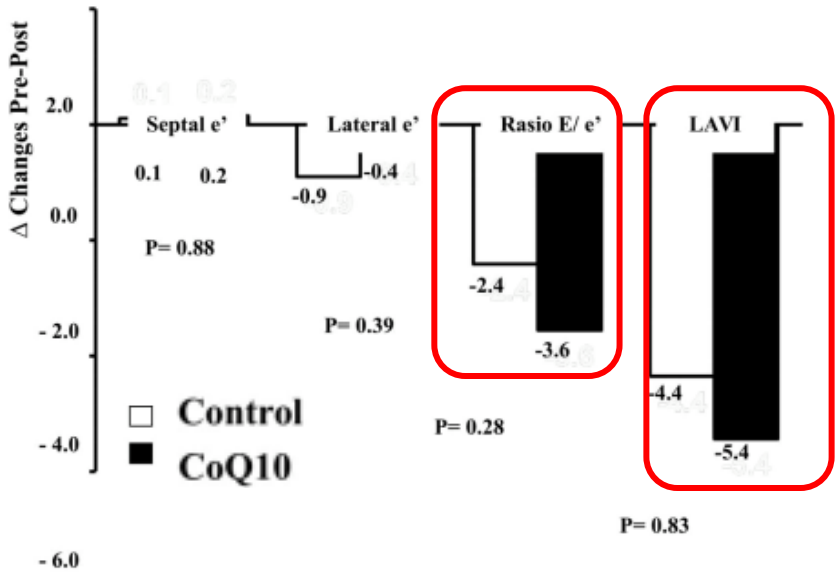
RRR 31%; NNT = 34

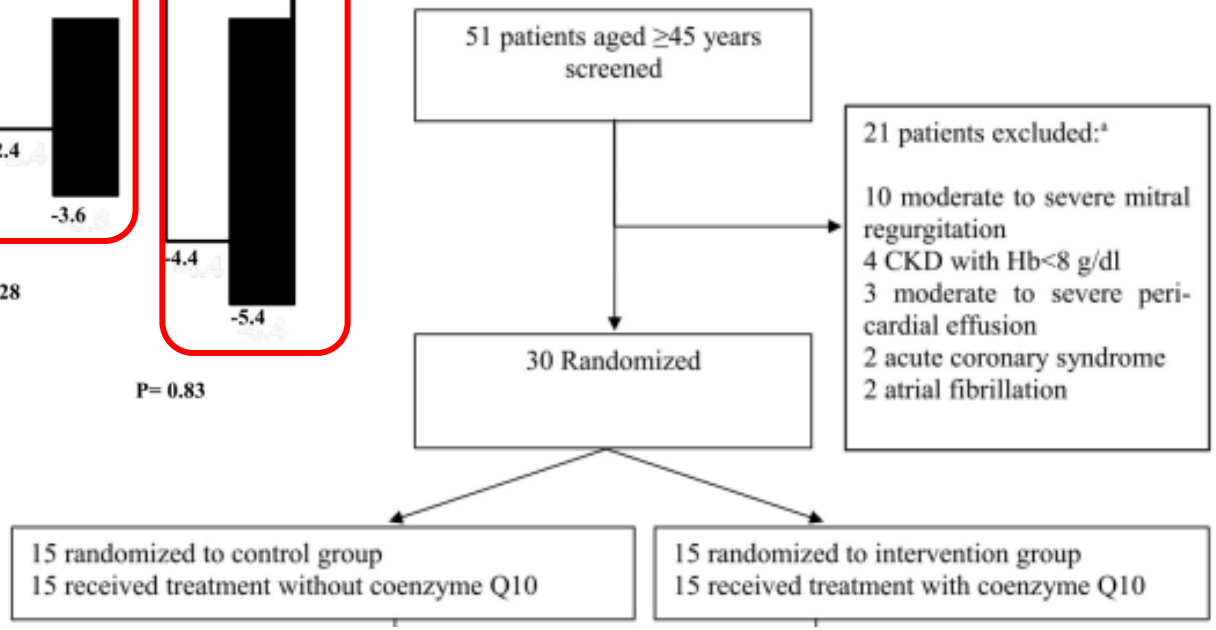
Original Article

DOI: 10.5582/ddt.2019.01004

Effects of coenzyme Q10 supplementation on diastolic function in patients with heart failure with preserved ejection fraction

Mochamad Ali Sobirin[1,2,*], Yan Herry[1], Sefri Noventi Sofia[1], Ilham Uddin[1], Sodiqur Rifqi[1], Hiroyuki Tsutsui[3]





Destijds (2013) groot cardio-nieuws!

International Journal of Cardiology 167 (2013) 1860–1866

Contents lists available at ScienceDirect

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journal homepage: www.

Conclusions

In a 1

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First drug to improve heart failure mortality in over a decade

Coenzyme Q10 decreases all cause mortality by half in randomised double blind trial

CoQ10 is the first medication to improve survival in chronic heart failure since ACE inhibitors and beta blockers more than a decade ago and should be added to standard heart failure therapy.

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Lisbon, 25 May 2013: Coenzyme Q10 decreases all cause mortality by half, according to the results of a multicentre randomised double blind trial presented today at Heart Failure 2013 congress. It is the first drug to improve heart failure mortality in over a decade and should be added to standard treatment, according to lead author Professor Svend Aage Mortensen (Copenhagen, Denmark).

	0.49	0.02	0.27–0.88
	0.56	0.03	0.33–0.95
IHD+EF<40%+HT	0.60	0.004	0.42–0.84
IHD+EF<40%+HT+DM	0.59	0.003	0.42–0.83

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ontrolled Trial in Elderly 2018

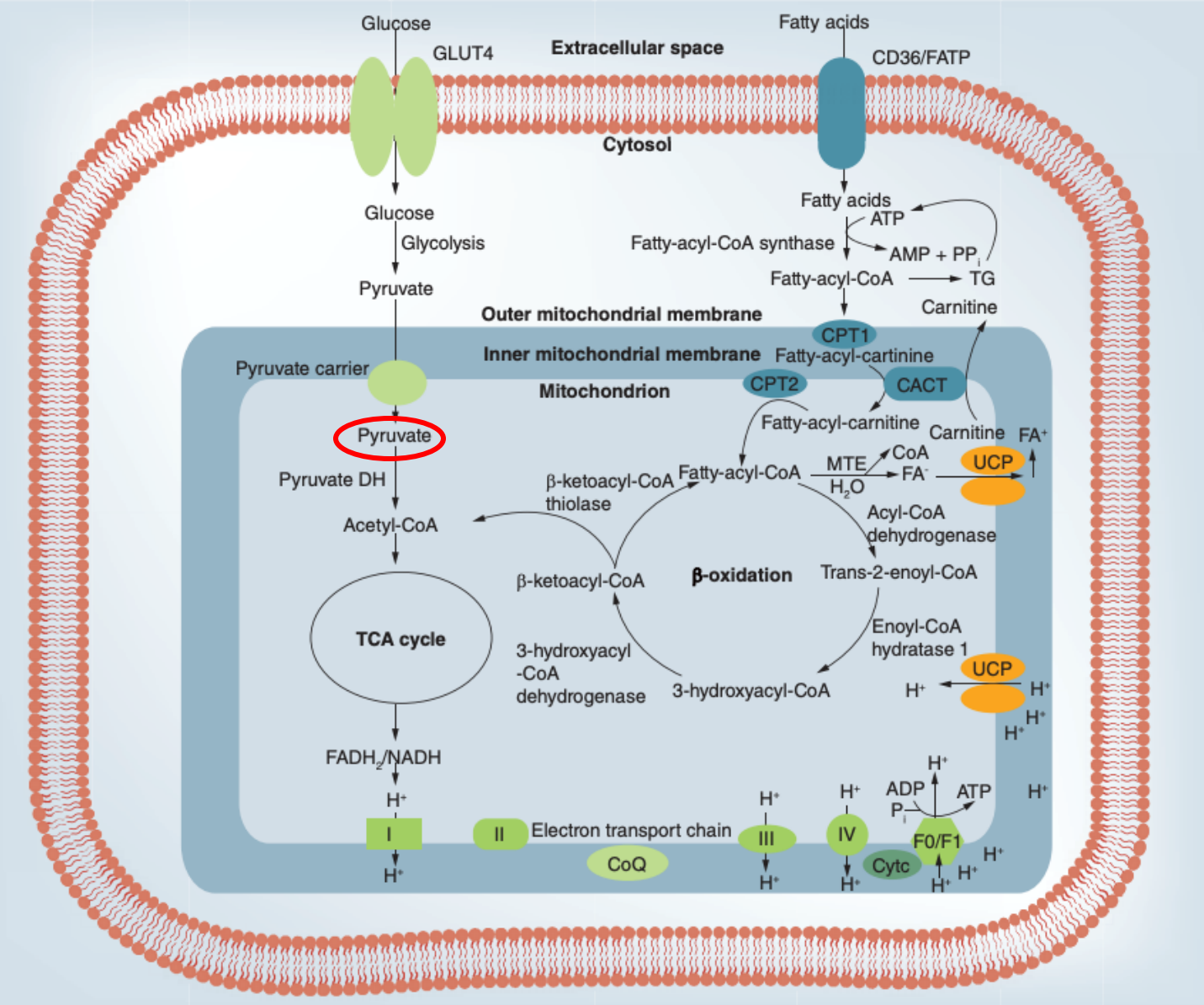
Urban Alehagen[1]*, Jan Aaseth[2], Peter Johansson[1]

PLOS

Table 4. Difference in cardiovascular mortality within 5, 10 and 12 years after intervention of selenium and coenzyme Q10

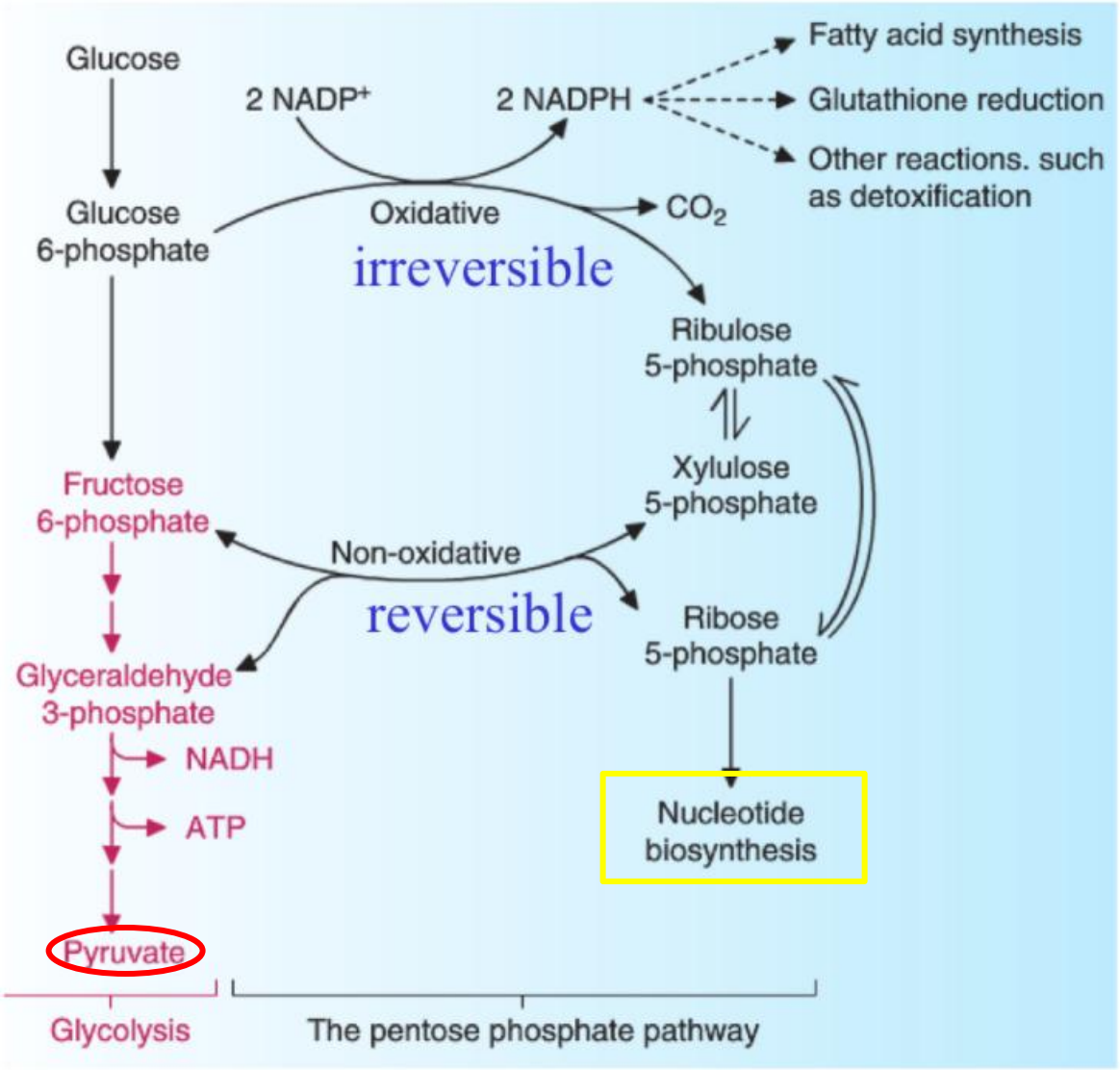
Follow-up time	Mortality in active treatment group (%)	Mortality in placebo group (%)	P-value
5 years	5.9	12.6	0.015
10 years	20.8	38.7	<0.0001
12 years	28.1	45.0	0.0002

Mitochondrial Energy Problems



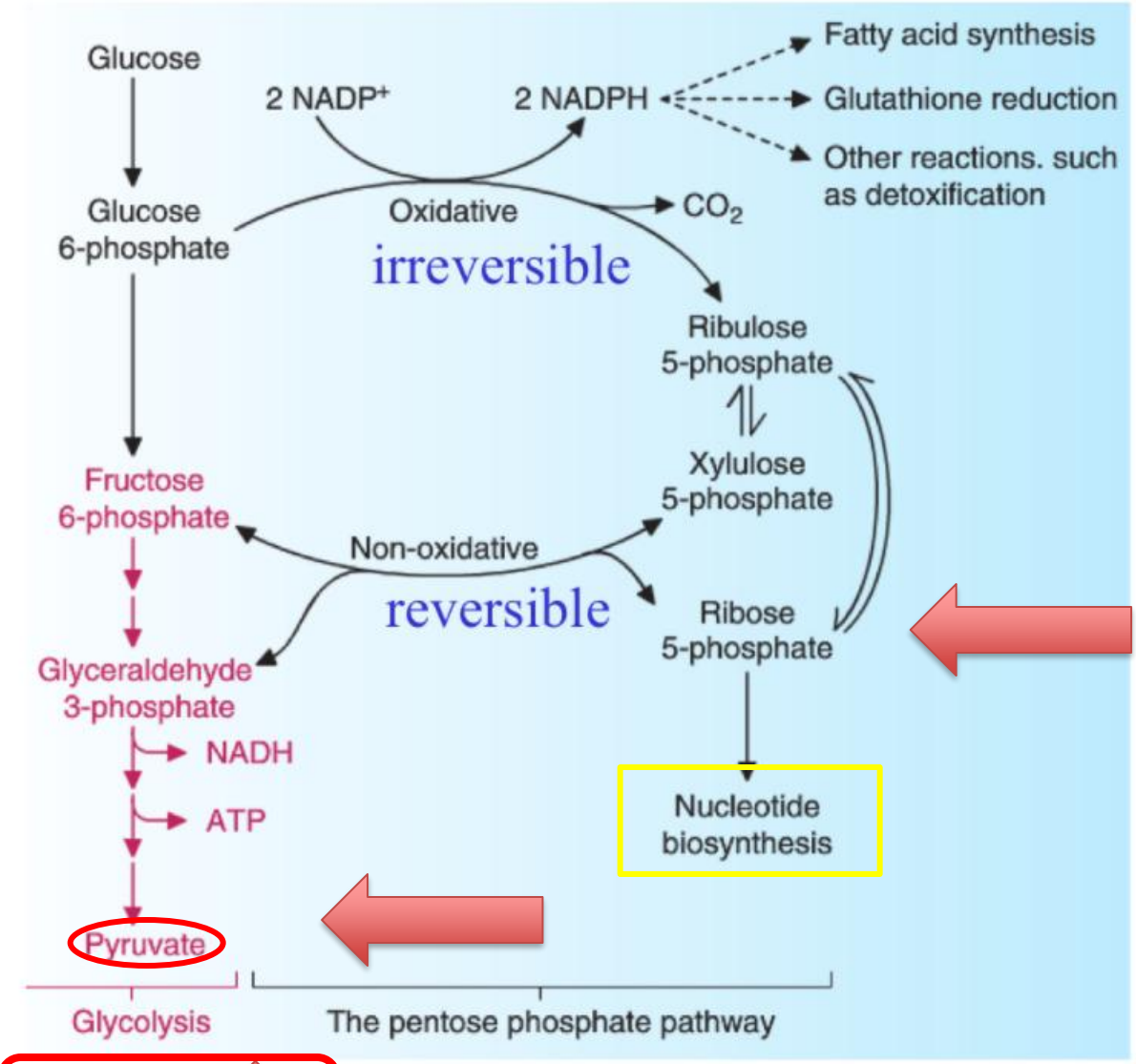
Muthuramu et al. Clinical lipidology 2015

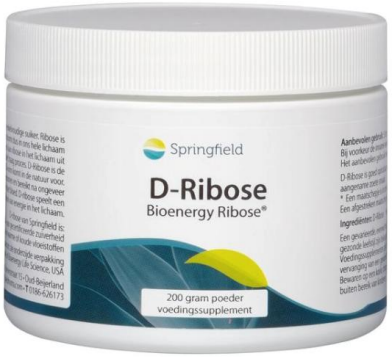
De Pentose Phosphate Pathway



Energy versus repair (DNA / RNA)

De Pentose Phosphate Pathway





Energy versus repair (DNA / RNA)

Normalization of Depressed Heart Function in Rats by Ribose

Abstract. *Severe constriction of the abdominal aorta and simultaneous injection of isoproterenol in rats induced depression in heart function and reductions in cardiac adenosine triphosphate and total adenine nucleotides. When ribose was continuously infused for 24 hours, biosynthesis of cardiac adenine nucleotides was stimulated to such an extent that the reductions in adenosine triphosphate and total adenine nucleotides were prevented and left ventricular hemodynamic parameters were normal. These results support the hypothesis that adenosine triphosphate is primarily responsible for depression in myocardial contractility and that ribose is cardioprotective through its pronounced effects on adenine nucleotide metabolism in heart muscle.*

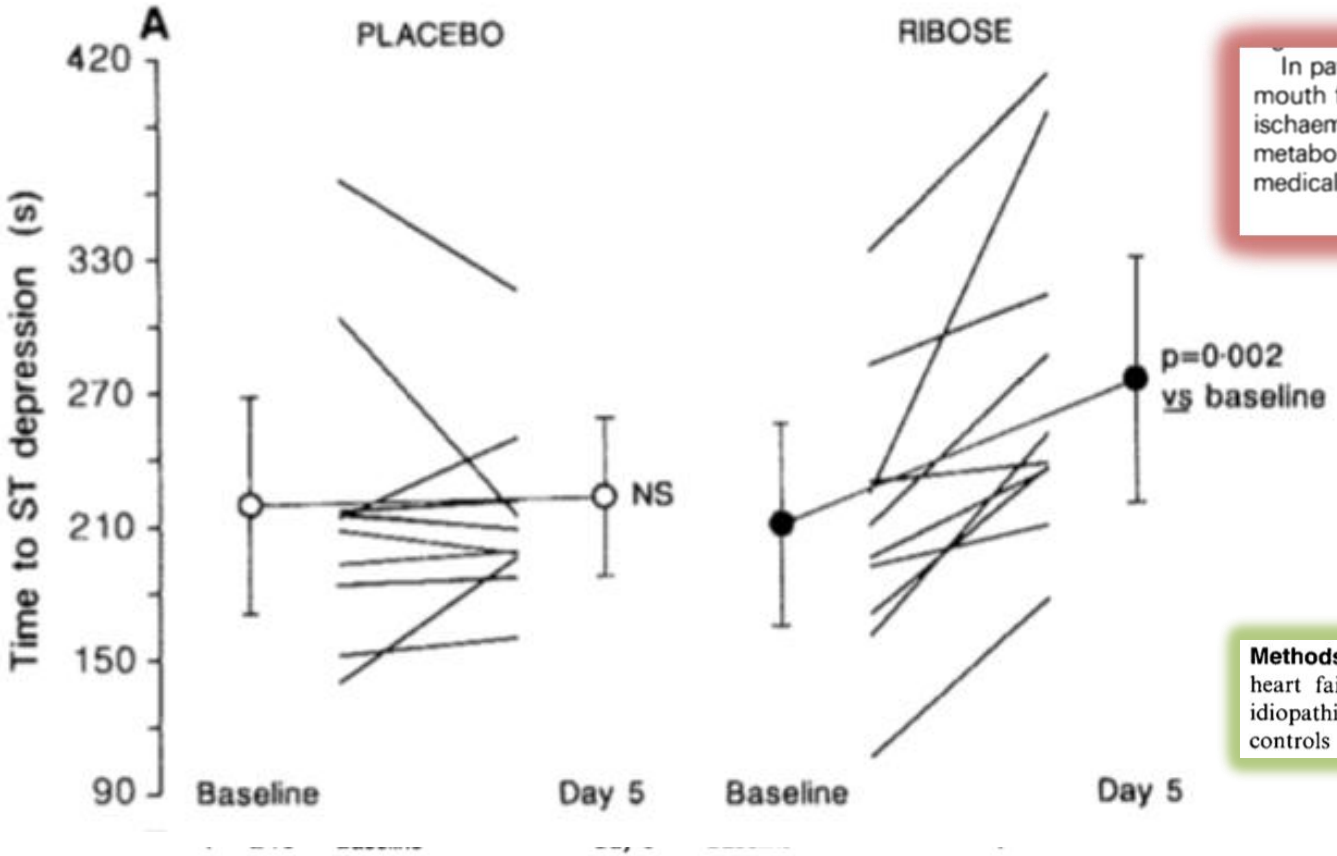
Table 1. Effect of aortic constriction (AC) and simultaneous injection of isoproterenol (ISO; 25 mg/kg, subcutaneously) on the myocardial content of ATP and total adenine nucleotides, left ventricular systolic pressure (LVSP), maximum rate of increase in left ventricular pressure, and the product of LVSP and heart rate (HR) in rats that had received a continuous intravenous infusion of 0.9 percent NaCl or ribose (200 mg/kg per hour) for 24 hours. Values are means ± standard errors for the number of experiments given in parentheses.

Treatment	ATP (μmole/g)	ATP, ADP, and AMP (μmole/g)	LVSP (mmHg)	Maximum rate of increase in LVSP (mmHg/sec)	LVSP × HR (mmHg/min)
Control	4.4 ± 0.07 (30)	5.8 ± 0.10 (30)	142 ± 4 (19)	6,073 ± 187 (19)	58,342 ± 1,897 (19)
AC + ISO + NaCl	3.4 ± 0.10 (14)*	4.7 ± 0.16 (14)*	111 ± 5 (11)*	4,699 ± 338 (11)*	34,764 ± 4,600 (11)*
AC + ISO + ribose	4.2 ± 0.10 (18)	5.7 ± 0.12 (18)	133 ± 6 (12)	6,231 ± 308 (12)	52,569 ± 2,637 (12)†

*Significantly different from corresponding control value ($P < .0005$, unpaired t-test). †$P < .05$.

Effects of ribose on exercise-induced ischaemia in stable coronary artery disease

WOLFGANG PLIML THOMAS VON ARNIM ALEXANDER STÄBLEIN
HUBERT HOFMANN HEINZ-GERD ZIMMER ERLAND ERDMANN



Treadmill walking times until ST-segment depression (A) and onset of moderate angina (B).

Baseline = average of results on days 1 and 2 for each patient; day 5 = after 3 days treatment. Mean and 95% confidence intervals given for each group.

In patients with CAD, administration of ribose by mouth for 3 days improved the heart's tolerance to ischaemia. The presumed effects on cardiac energy metabolism offer new possibilities for adjunctive medical treatment of myocardial ischaemia.

Lancet 1992; **340**: 507–10.

Methods Fifty nine patients with a diagnosis of chronic heart failure due to coronary heart disease (n=34) or idiopathic dilated cardiomyopathy (n=25) and 20 healthy controls underwent assessment of functional capacity.

Wat eten mensen gemiddeld?

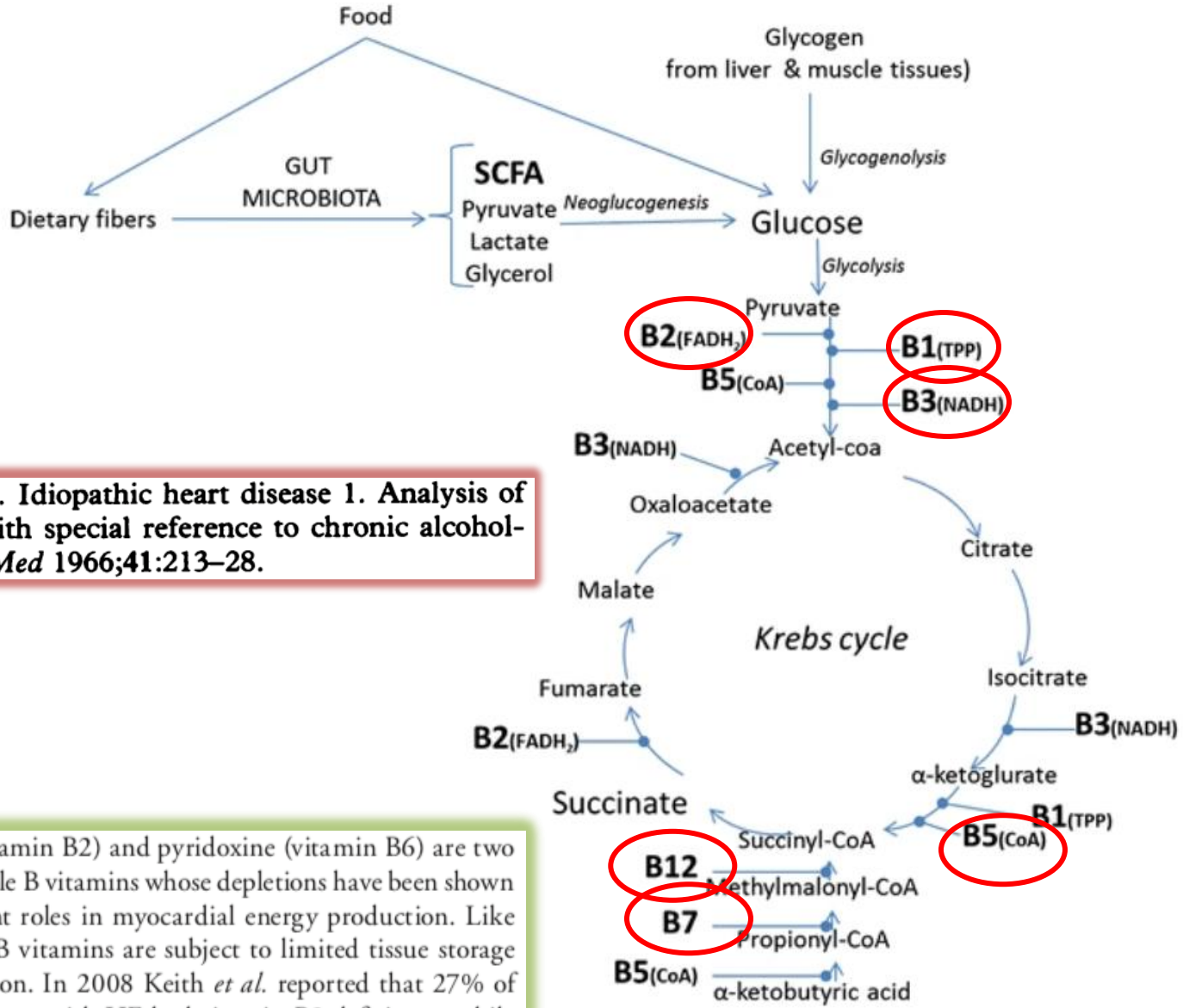
Tabel 18: Percentage Westerlingen dat aan ADH voldoet

Nutriënt	Aanbeveling	Percentage
Natrium	2400 mg	100
Selenium	70 ug	91
Riboflavine / B2	1.7 mg	89
IJzer	18 mg	89
Niacine / B3	20 mg	87
Fosfor	1000 mg	87
Koper	2 mg	84
Thiamine / B1	1.5 mg	82
Vitamine B12	6 ug	80
Pyridoxine / B6	2 mg	74
Zink	15 mg	71
Foliumzuur	400 ug	60
Vitamine C	60 mg	51
Vitamine A	900 ug	46
Magnesium	400 mg	43
Vitamine E	30 IU	14
Jodium	150 ug	<10*
Kalium	4700 mg	8

* Indien het gebruik van gejodeerd zout (o.a. in brood) niet wordt meegerekend

Bron: Kuipers, Oerdieet

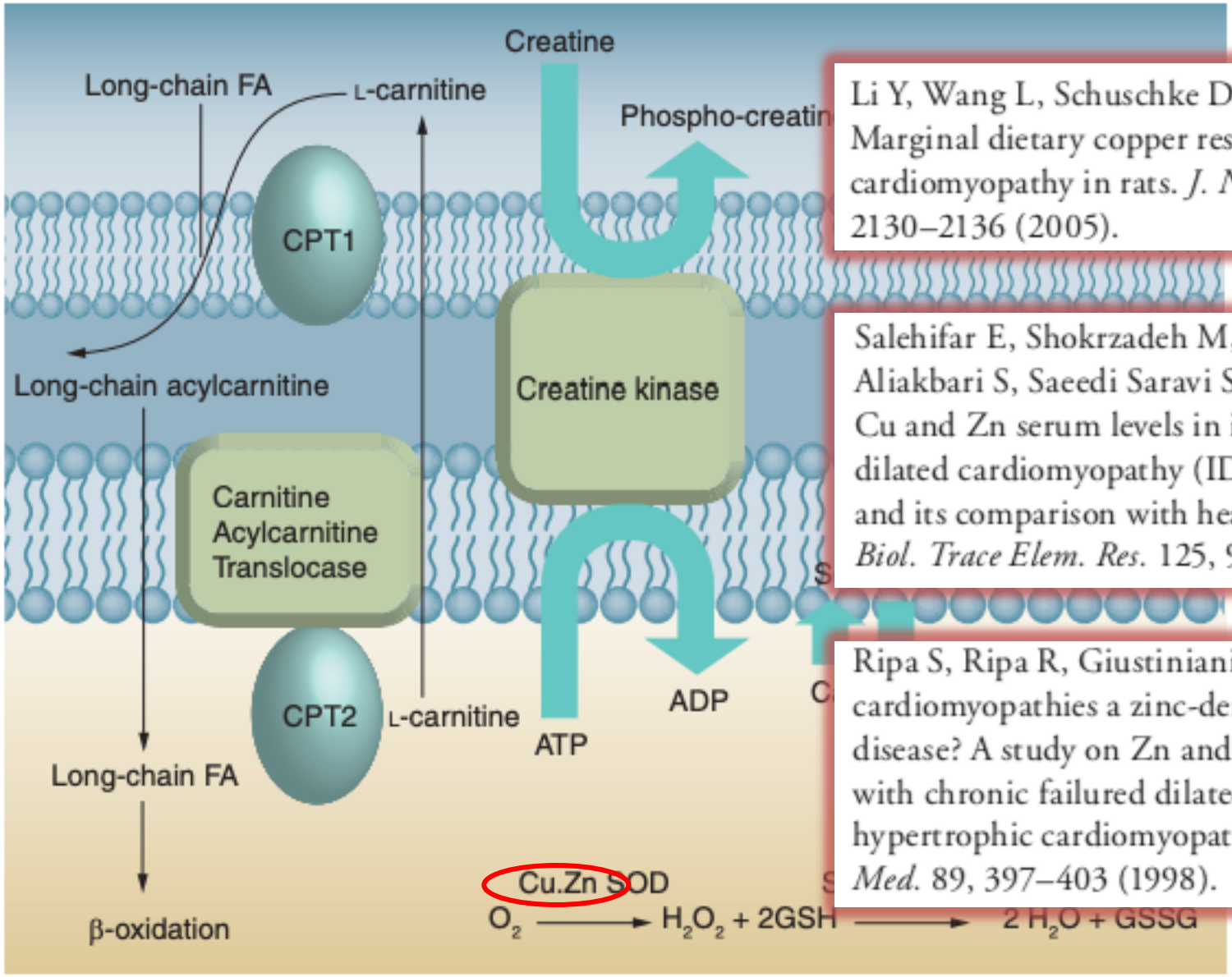
The citric acid / tricarboxylic / Krebs Cycle



Alexander CS. Idiopathic heart disease 1. Analysis of 100 cases with special reference to chronic alcoholism. *Am J Med* 1966;41:213–28.

Riboflavin (vitamin B2) and pyridoxine (vitamin B6) are two other water-soluble B vitamins whose depletions have been shown to play important roles in myocardial energy production. Like thiamine, these B vitamins are subject to limited tissue storage and renal excretion. In 2008 Keith *et al.* reported that 27% of hospitalized patients with HF had vitamin B2 deficiency, while 38% had vitamin B6 deficiency [26]. In the same study, the use

Expert Rev. Cardiovasc. Ther. 9(9), 1161–1170 (2011)



Li Y, Wang L, Schuschke DA *et al.* Marginal dietary copper restriction induces cardiomyopathy in rats. *J. Nutr.* 135, 2130–2136 (2005).

Salehifar E, Shokrzadeh M, Ghaemian A, Aliakbari S, Saeedi Saravi SS. The study of Cu and Zn serum levels in idiopathic dilated cardiomyopathy (IDCMP) patients and its comparison with healthy volunteers. *Biol. Trace Elem. Res.* 125, 97–108 (2008).

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Figure 2. Interaction of micronutrients in cellular metabolism.
CPT1: Carnitine palmitoyltransferase 1; FA: Fatty acid.

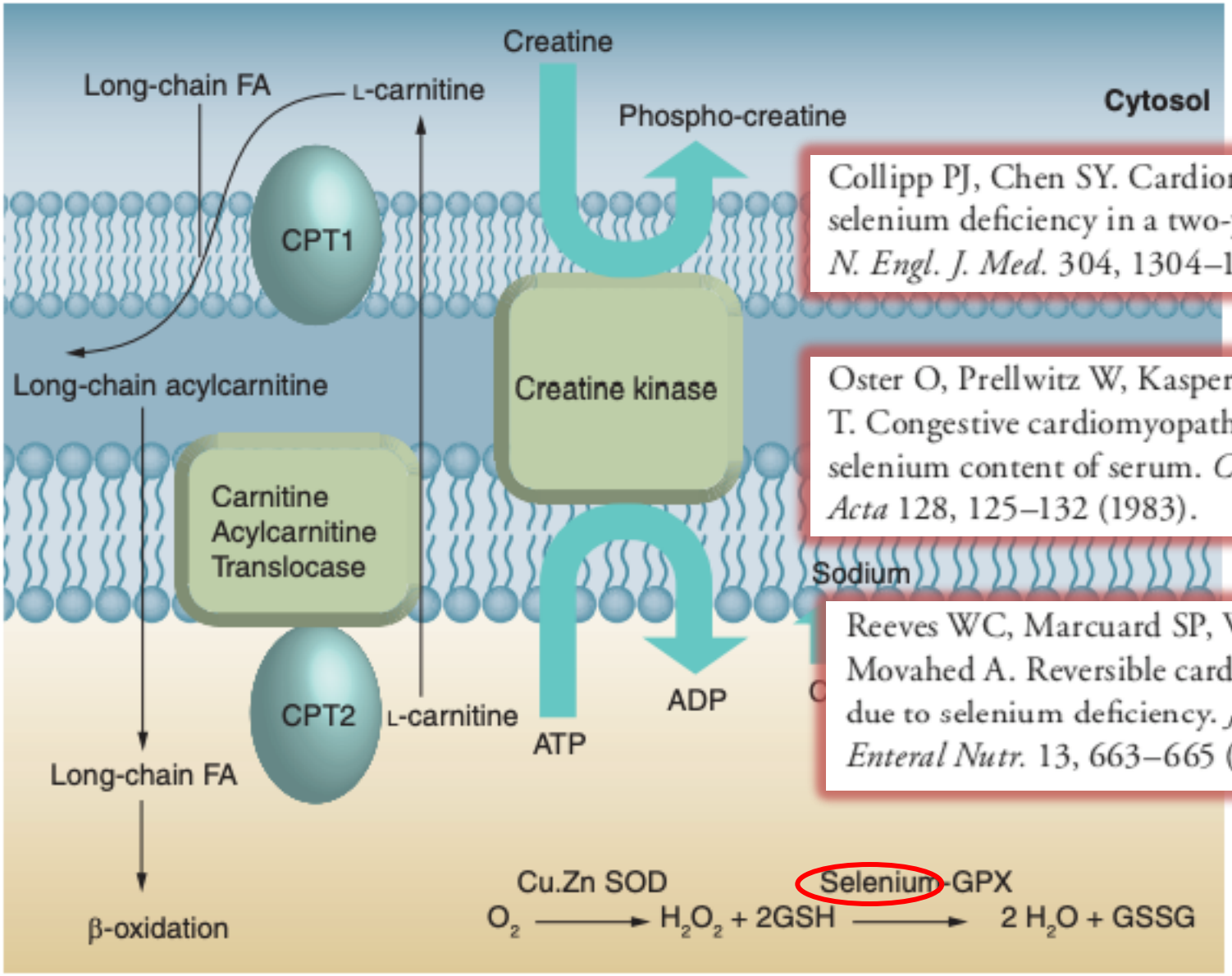

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Figure 2. Interaction of micronutrients in cellular metabolism.
CPT1: Carnitine palmitoyltransferase 1; FA: Fatty acid.

> Biomed Res Int. 2019 Nov 17;2019:4352905. doi: 10.1155/2019/4352905. eCollection 2019.

Expression Profile Analysis of Selenium-Related Genes in Peripheral Blood Mononuclear Cells of Patients with Keshan Disease

Xiaojuan Liu [1], Shulan He [1], Juanxia Peng [1], Xiong Guo [2 3], Wuhong Tan [2 3]

Affiliations + expand

PMID: 31828104 PMCID: PMC6885826 DOI: 10.1155/2019/4352905

Free PMC article

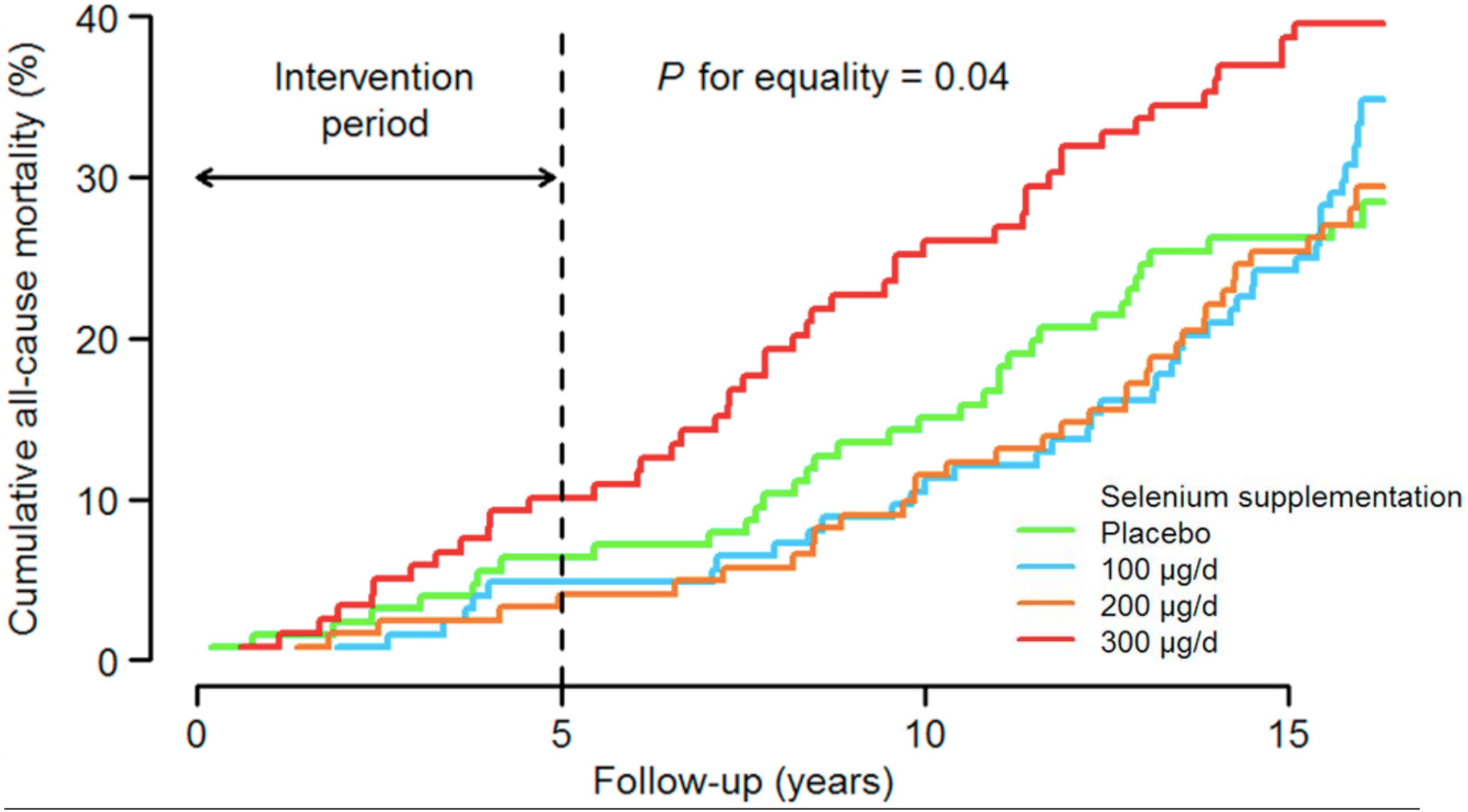
Abstract

Keshan disease (KD) is an endemic cardiomyopathy, which mainly occurs in China. Selenium deficiency is believed to play an important role in the pathogenesis of KD, but the molecular mechanism of selenium-induced damage remains unclear.

Based on our results, we suggest that selenium might contribute to the development of KD through dysfunction of selenium-related genes involved in apoptosis, metabolism, ion transport, and growth and development in the myocardium.

Selenium content in most parts of Europe is considerably poorer than in the United States. The average intake of selenium in Eastern Europe is lower than in Western Europe. [8] At one time, Finland had the lowest intake of selenium, but they fortified their fertilizers with selenium and have since changed the equation. Brazil nuts and kidney are the mainstay sources of selenium in these countries. Crab, liver, other shellfish, and fish provide moderate sources,

Maar: it's the dose that makes…



Rayman et al FRBM 2018

> Altern Ther Health Med. 2009 May-Jun;15(3):44-52.

Metabolic cardiology: an integrative strategy in the treatment of congestive heart failure

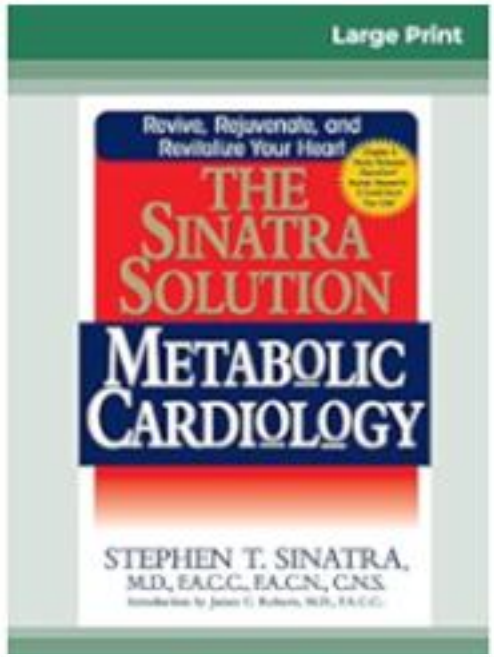
Stephen T Sinatra [1]

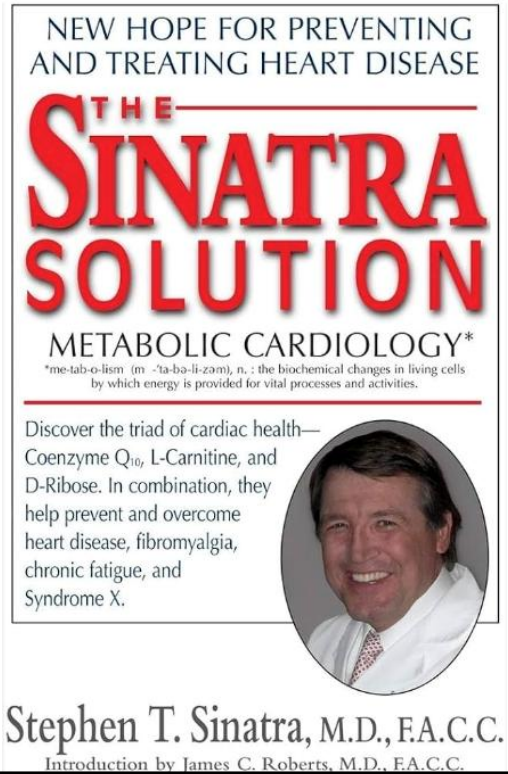
Affiliations + expand

PMID: 19472864

Abstract

Congestive heart failure (CHF) and dilated cardiomyopathy are life-threatening conditions in which the heart muscle is so weak that effective pulsatile action is compromised. Pulmonary vascular congestion and swelling in the lower extremities as well as in the liver and lining of the gastrointestinal tract frequently cause overwhelming symptoms and disability. Millions of Americans suffer from CHF, and more than 500,000 cases are diagnosed annually. Cardiovascular diseases such as hypertension with left ventricular hypertrophy, valvular heart disease, coronary artery disease, myocarditis, and various cardiomyopathies can lead to the progressive onset of CHF. The purpose of this communication article is to introduce metabolic cardiology as a vital therapeutic strategy utilizing nutritional biochemical interventions that preserve and promote adenosine triphosphate (ATP) production. Treatment options that incorporate metabolic interventions targeted to preserve energy substrates (D-ribose) or accelerate ATP turnover (L-carnitine and coenzyme Q10) are indicated for at-risk populations or patients at any stage of CHF. The integration of these metabolic supports provides the missing link in CHF treatment that has been eluding physicians for decades.





nutrients

Proof of principle

MDPI

Article

A Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Effectiveness of a Food Supplement Containing Creatine and D-Ribose Combined with a Physical Exercise Program in Increasing Stress Tolerance in Patients with Ischemic Heart Disease

Giuseppe Derosa [1,2,3,*], Silvia Pasqualotto [4], Gabriele Catena [5], Angela D'Angelo [1,3], Antonio Maggi [6] and Pamela Maffioli [1]

5. Conclusions

Supplementation with creatine, D-ribose, vitamin B_1, and vitamin B_6, in addition to standard therapy and a physical exercise program, seems to be helpful and to improve exercise tolerance compared to the placebo in a population with cardiovascular disease tracked in a secondary prevention program. However, future studies will be required to confirm these preliminary data and to better

Nutrients **2019**, *11*, 3075; doi:10.3390/nu11123075

European Heart Journal (2005) **26**, 2238–2244
doi:10.1093/eurheartj/ehi442

EUROPEAN SOCIETY OF CARDIOLOGY®

Proof of principle

Clinical research

The effect of micronutrient supplementation on quality-of-life and left ventricular function in elderly patients with chronic heart failure

Klaus K.A. Witte[1*], Nikolay P. Nikitin[1], Anita C. Parker[1], Stephan von Haehling[2], Hans-Dieter Volk[3], Stefan D. Anker[4], Andrew L. Clark[1], and John G.F. Cleland[1]

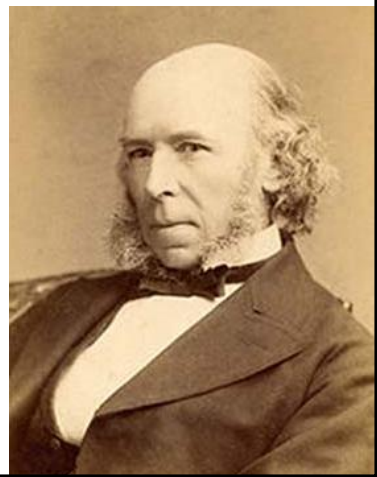
Methods and results Thirty CHF patients [age 75.4 (0.7), mean (SEM), LV ejection fraction (LVEF) $\leq$35%] were randomized to receive capsules containing a combination of high-dose micronutrients (calcium, magnesium, zinc, copper, selenium, vitamin A, thiamine, riboflavin, vitamin B_6, folate, vitamin B_{12}, vitamin C, vitamin E, vitamin D, and Coenzyme Q10) or placebo for 9 months in a double-blind fashion. All subjects were on stable optimal medical therapy for at least 3 months before enrolment.

Conclusion Long-term multiple micronutrient supplementation can improve LV volumes and LVEF and QoL scores in elderly patients with heart failure due to LV systolic dysfunction.

Take home message No. 16:

Multi-vitamine suppletie (als mitochondriale booster) bij hartfalen wordt ondersteund door wetenschappelijke studies.

Bij chronische vermoeidheidssyndromen (oa fibromyalgie) remains to be elucidated



Guidelines

Circulation
Volume 112, Issue 12, 20 September 2005, Pages e154-e235
https://doi.org/10.1161/CIRCULATIONAHA.105.167586

ACC/AHA PRACTICE GUIDELINES

ACC/AHA 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult

4.3.1.5. Drugs and Interventions of Unproved Value and Not Recommended

4.3.1.5.1. Nutritional Supplements and Hormonal Therapies. Patients with HF, particularly those treated with diuretics, may become deficient in vitamins and micronutrients. Several nutritional supplements (e.g., coenzyme Q10, carnitine, taurine, and antioxidants) and hormonal therapies (e.g., growth hormone or thyroid hormone) have been proposed for the treatment of HF (424-429). Aside from replenishment of documented deficiencies, randomized trials have failed to demonstrate benefit for routine vitamin, nutritional, or hormonal supplementation (430).

In most data or other literature regarding nutraceuticals, there are issues, including outcomes analyses, adverse effects, and drug-nutraceutical interactions, that remain unresolved. No clinical trials have demonstrated improved survival in users of nutritional or hormonal therapy. Some studies have suggested a possible effect for coenzyme Q10 in reduced hospitalization rates, dyspnea, and edema in patients with HF, but these benefits have not been seen uniformly (431-434). Because of possible adverse effects and drug interactions of nutritional supplements and their widespread use, physicians caring for patients with HF should routinely inquire about their use. Until more data are available, nutritional supplements or hormonal therapies are not recommended for the treatment of HF. The ACCF Clinical Expert

Circulation
Volume 136, Issue 6, 8 August 2017, Pages e137-e161
https://doi.org/10.1161/CIR.0000000000000509

CLINICAL STATEMENTS AND GUIDELINES - ACC/AHA/HFSA FOCUSED UPDATEACC/AHA/HFSA FOCUSED UPDATE

2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Failure Society of America

Nothing

European Heart Journal (2016) **37**, 2129–2200
doi:10.1093/eurheartj/ehw128

ESC GUIDELINES

2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

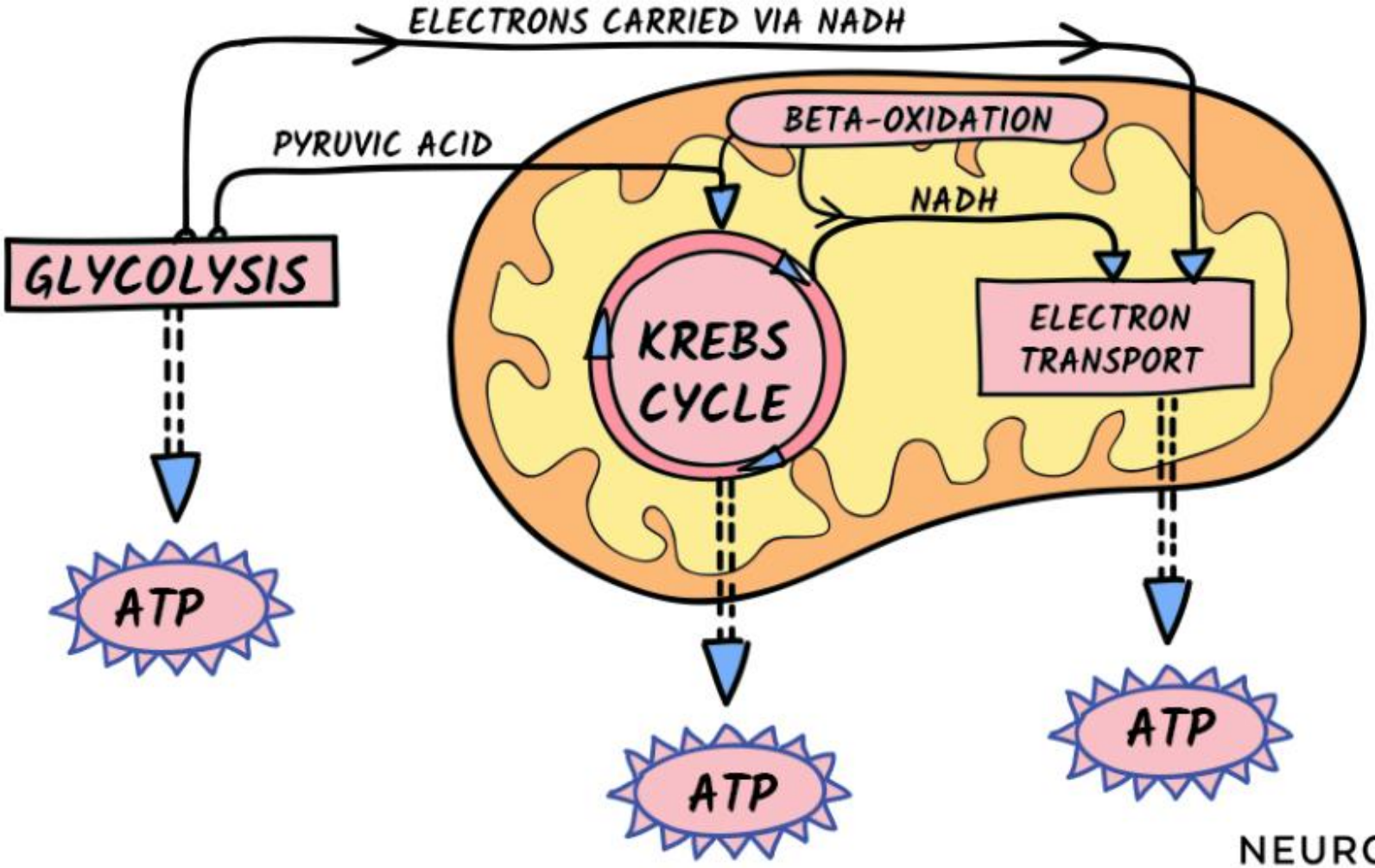
Table 3.4 Aetiologies of heart failure

Deficiencies in thiamine, L-carnitine, selenium, iron, phosphates, calcium,

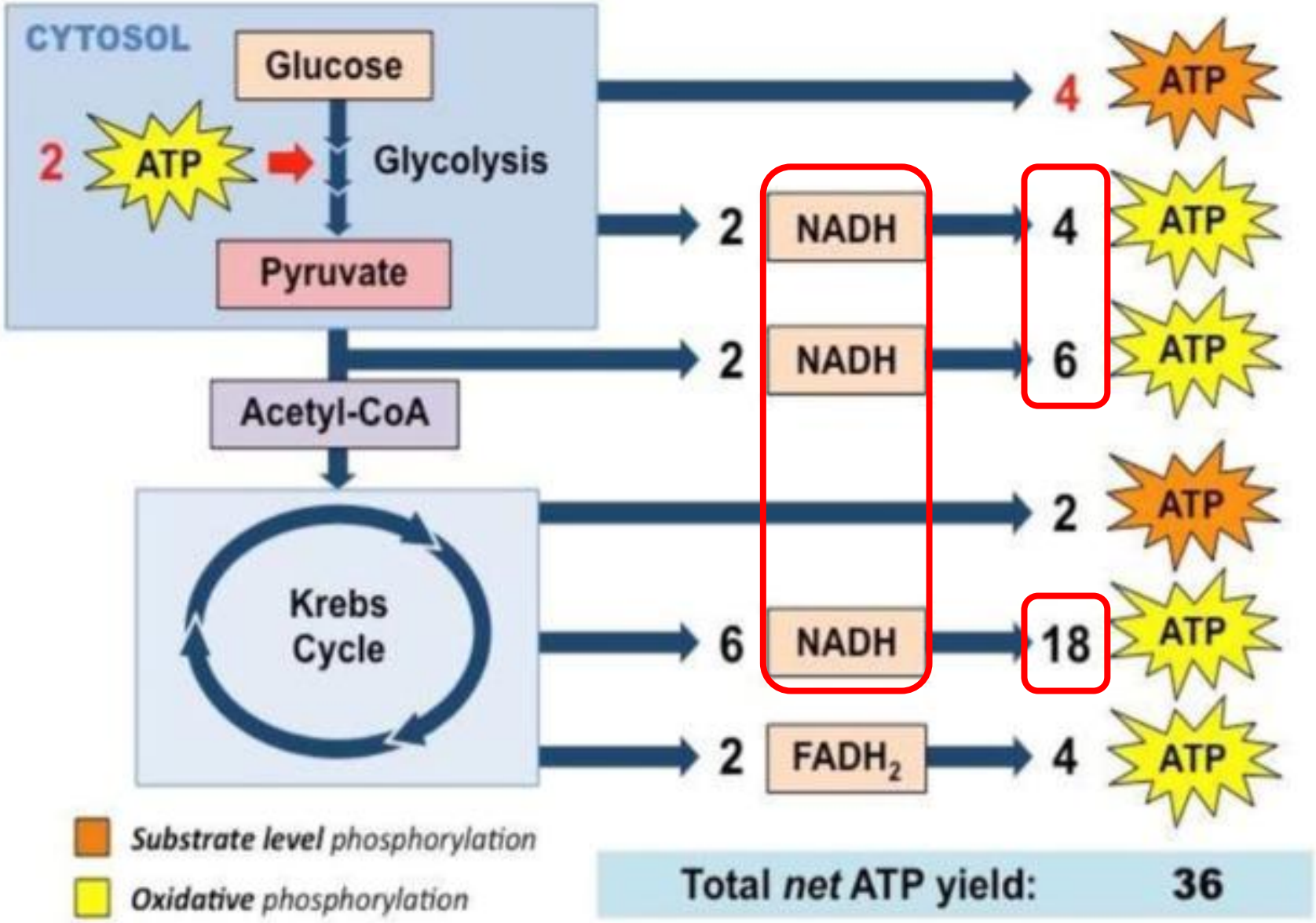
430. Morris CD, Carson S. Routine vitamin supplementation to prevent cardiovascular disease: a summary of the evidence for the U.S. Preventive Services Task Force. Ann Intern Med 2003;139:56-70.

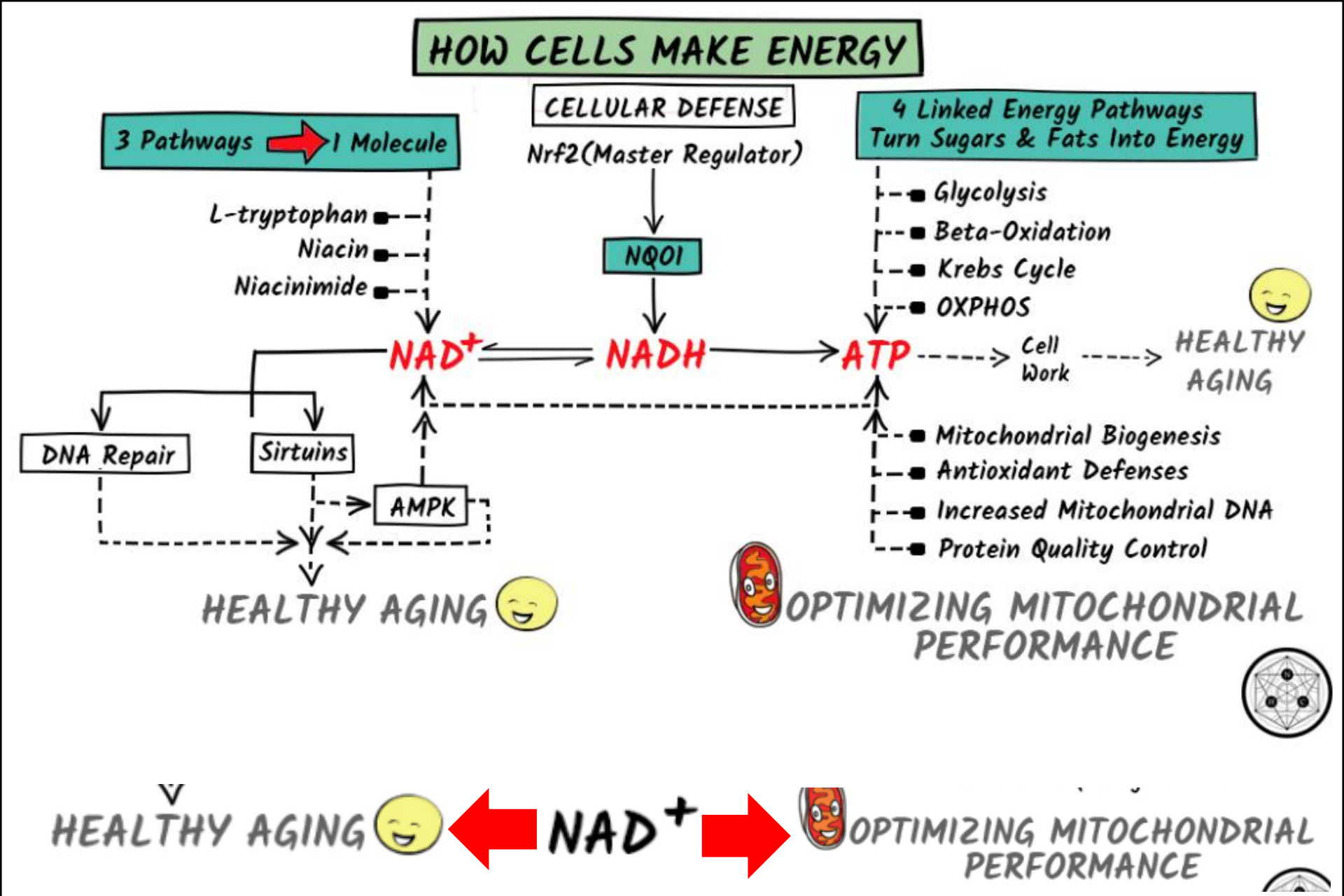
Verdieping 2

Cellular regeneration,senescense, autophagy, longevity

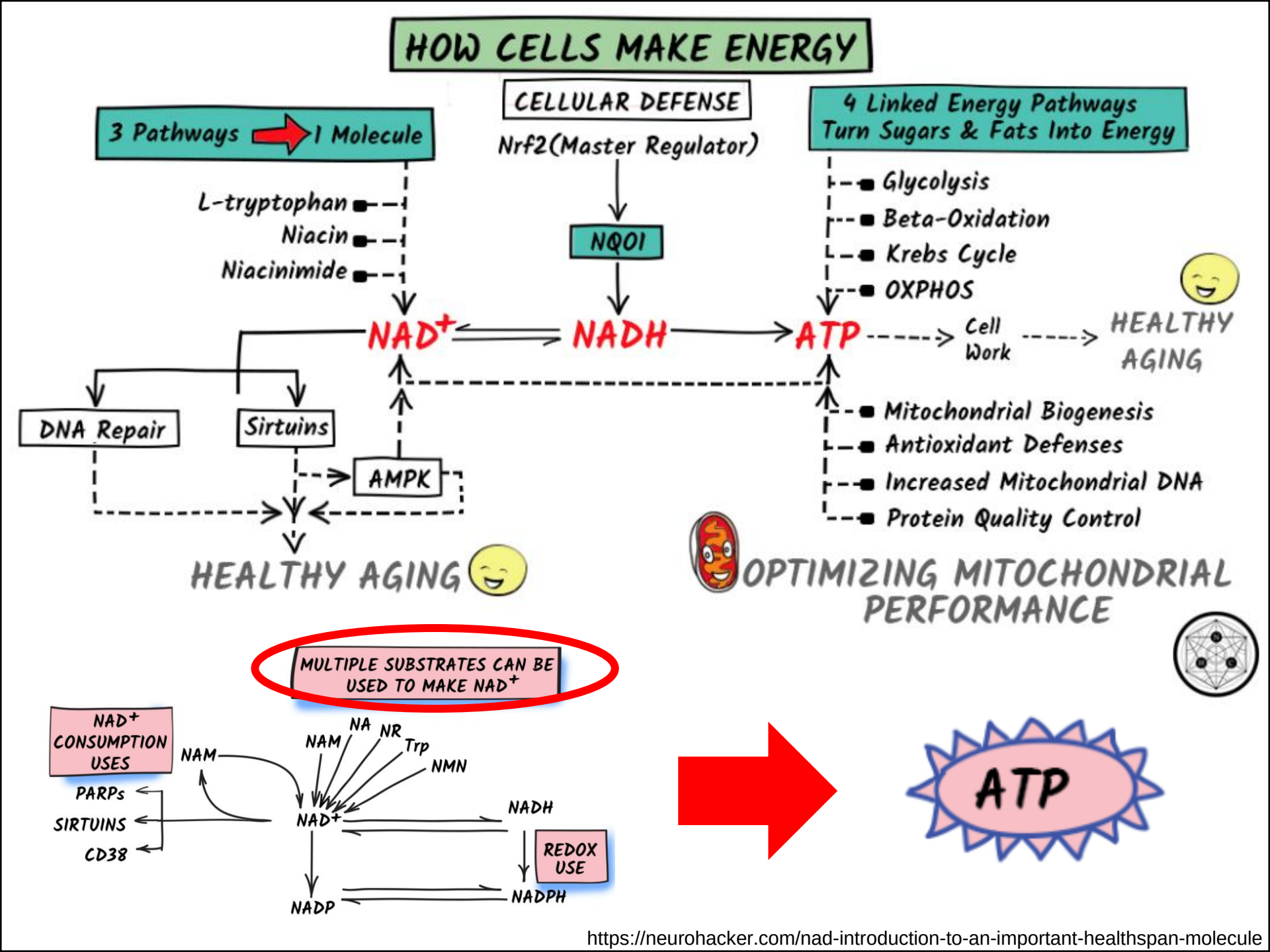


De Electronentransportketen (ETC/Beta-oxidatie) is afhankelijk van NADH/FADH2 en daarmee is de NADH/NAD+ ratio belangrijk voor mitochondriale oxydatieve phosphorylatie (OXPHOS) of wel voor ATP productie


CYTOSOL
Glucose
2
ATP
Glycolysis
Pyruvate
Acetyl-CoA
Krebs Cycle
4
ATP
2
NADH
4
ATP
2
NADH
6
ATP
2
ATP
6
NADH
18
ATP
2
FADH2
4
ATP
Substrate level phosphorylation
Oxidative phosphorylation
Total net ATP yield:
36



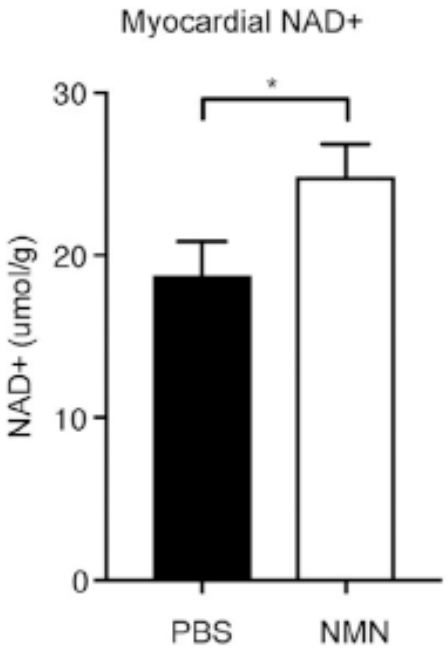
https://neurohacker.com/nad-introduction-to-an-important-healthspan-molecule

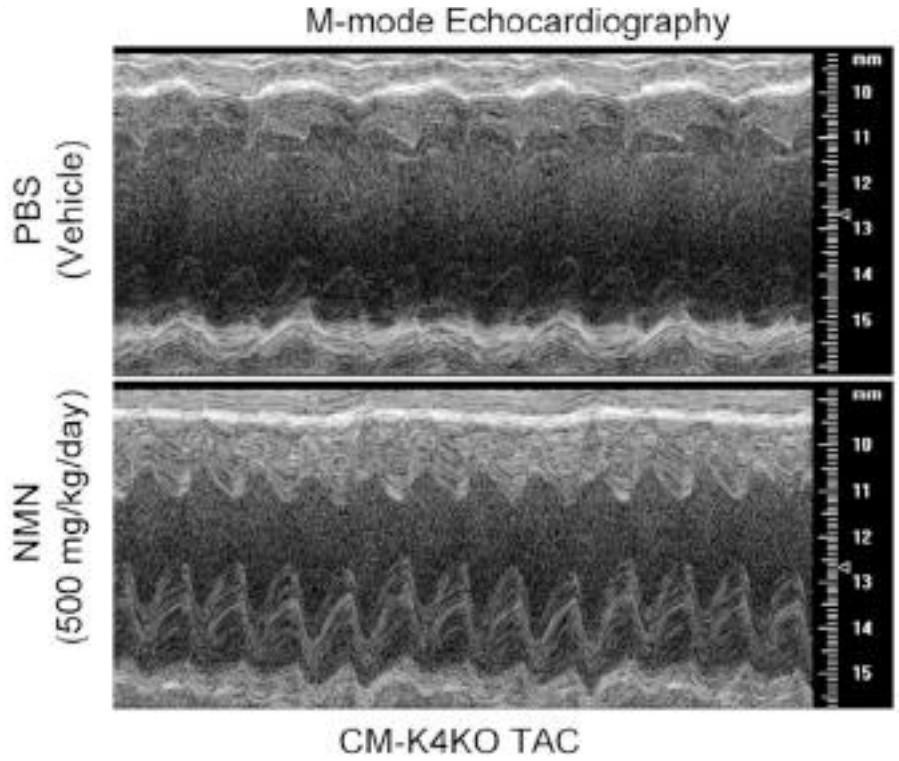


https://neurohacker.com/nad-introduction-to-an-important-healthspan-molecule

Nicotinamide Mononucleotide (NMN)

Short-term administration of Nicotinamide Mononucleotide preserves cardiac mitochondrial homeostasis and prevents heart failure





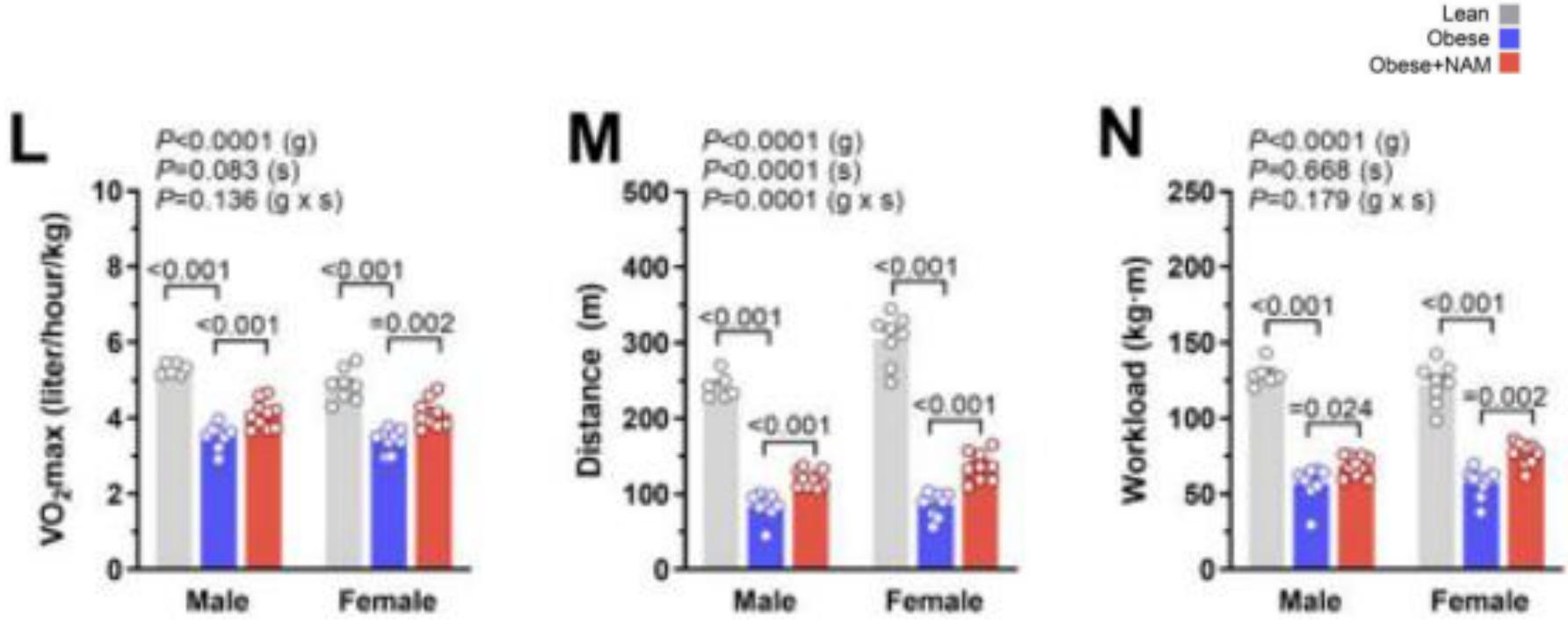
J Mol Cell Cardiol. 2017 November ; 112: 64–73. doi:10.1016/j.yjmcc.2017.09.001.

Nicotinamide

Nicotinamide for the treatment of heart failure with preserved ejection fraction*

Sci Transl Med. Author manuscript; available in PMC 2021 August 16.

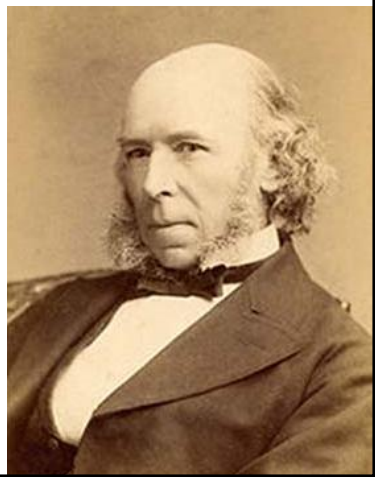
Mahmoud Abdellatif[1], Viktoria Trummer-Herbst[1], Franziska Koser[2], Sylvère Durand[3,4],



Sci Transl Med. ; 13(580): . doi:10.1126/scitranslmed.abd7064.

Take home message No. 17:

Mitochondriale ondersteuning vanuit NAD plus invloed NAD op herstel onderwerp van actuele studies.



Future perspectives

- Stimuleren NAMPT
  - Polyfenolen uit oa blauwe bessen en groene thee
- Remmen CD38
  - Quercetine, apigenine
- Senolytica
  - Fisetine

- Autophagy
  - Spermidine
  - Alfa liponzuur
- SIRT –activatie
  - Pterostilbeen
  - Resveratrol
- NFkB
  - Rapamycin

Terug naar ons blauwdrukdieet

Energie → **Micronutriënten**

Koolhydraten
Eiwitten
Vetten

Vezels
Vitaminen
Mineralen

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